

## Request for Proposal

Invitation of Request for Proposal (RFP) for setting up a “**CoE on Centre of Design and Computational Skilling (CDCS)**” for Skill Development & Research at OTR, Bhubaneswar.



**Odisha University of Technology and Research**  
**Techno Campus, Ghatikia, Bhubaneswar, Odisha**  
**[www.outr.ac.in](http://www.outr.ac.in)**

## Table of Contents

1	Glossary of Terms .....	4
2	Fact Sheet .....	5
3	Request for Proposal.....	6
4	Structure of the RFP .....	6
5	Project Background .....	6
5.1	Basic Information .....	6
5.2	About OUTR .....	6
5.3	Project Profile.....	7
6	Instruction to the Bidders .....	7
6.1	General Information .....	7
6.2	Compliant Proposals / Completeness of Response .....	7
6.3	Pre-Bid Meeting and Clarifications.....	8
6.3.1	Pre-Bid Conference .....	8
6.3.2	Responses to Pre-Bid Queries and Issue of Corrigendum .....	8
6.4	Key Requirements of the Bid .....	8
6.4.1	Right to Terminate the Process .....	8
6.4.2	RFP Document Fees .....	8
6.4.3	Earnest Money Deposit.....	8
6.5	Submission of Proposal .....	9
6.5.1	Instruction to Bidders for Bid Submission .....	9
6.5.2	Tender Validity.....	10
6.5.3	Submission and Opening of Proposals.....	10
6.5.4	Late Bids.....	10
6.5.5	Proposal Preparation Costs.....	10
6.5.6	Language.....	10
6.5.7	Acceptance and Rejection of Bids .....	11
6.6	Evaluation Process .....	11
7	Criteria for Evaluation .....	11
7.1	Pre-Qualification Criteria .....	13
7.2	Technical Evaluation Criteria .....	13
7.3	Evaluation of Commercial Bids .....	15
7.4	Final Evaluation of Bids .....	15
8	Award the contract .....	16

8.1	Award Criteria .....	16
8.2	Right to Accept Any Proposal and To Reject Any or All Proposal(s) .....	16
8.3	Purchaser's Procurement Rights .....	16
8.4	Notification of Award .....	16
8.5	Contract Finalization and Award .....	16
8.6	Performance Guarantee .....	16
8.7	Signing of Contract .....	17
8.8	Failure to Agree with the Terms and Conditions of the RFP .....	17
8.9	Penalties for delay in Implementation .....	17
9	Formats for Response .....	18
9.1	Pre-Qualification Bid Formats .....	18
9.1.1	FORM PQ-1: Cover Letter (To be submitted on the Letterhead of Bidder) 30.....	18
9.1.2	FORM PQ-2: Bidder's Organization (General Details).....	19
9.1.3	FORM PQ-3: Acceptance of Terms and Conditions .....	20
9.1.4	FORM PQ-4: Project Citation Format .....	21
9.1.5	FORM PQ-5: Bank Guarantee Template.....	22
9.1.6	FORM PQ-6: Manufacturer's Authorization Form (MAF).....	23
9.1.7	FORM PQ-7: Format for Non-blacklisting Declaration .....	24
9.2	<b>Technical Bid Formats.....</b>	<b>25</b>
9.2.1	FORM TECH-1: Description of Proposed Solution .....	25
9.2.2	FORM TECH-2: Description of Proposed Approach & Methodology.....	25
9.3	<b>TECH-3: Detailed Work Plan .....</b>	<b>26</b>
9.3.1	FORM FIN-1: Financial Bid Covering Letter .....	27
9.3.2	FORM FIN-2: Financial Quote (Break-up) .....	28
	<b>Volume-II: Terms of Reference.....</b>	<b>29</b>

## 1 Glossary of Terms

<b>CIDR</b>	Central Identities Data Repository
<b>EMD</b>	Earnest Money Deposit
<b>FRS</b>	Functional Requirement Specification
<b>GST</b>	Goods and Services Tax
<b>ICT</b>	Information and Communication Technology
<b>IT</b>	Information Technology
<b>ITES</b>	Information Technology Enabled Services
<b>KYR</b>	Know Your Resident
<b>Nos</b>	Numbers
<b>OUTR</b>	Odisha University of Technology and Research
<b>OSD</b>	Original Software Developer
<b>OSRDH</b>	Odisha State Resident Data Hub
<b>PBG</b>	Performance Bank Guarantee
<b>PMU</b>	Project Management Unit
<b>PSU</b>	Public Sector Undertaking
<b>QCBS</b>	Quality & Cost-Based Selection
<b>RFP</b>	Request for Proposal
<b>SSP</b>	Software Solution Provider
<b>TP</b>	Technology Partner

## 2. Fact Sheet

SI No	Item	Description
a)	Project Title	Selection of System Integrator-cum-Implementing Agency as Technology Partner (TP) for setting up a Centre of Excellence on <b>Centre of Design and Computational Skilling ( CDCS) for skill development &amp; Research</b> at OUTR, Bhubaneswar.
b)	Name of Purchaser	Odisha University of Technology and Research (OUTR), Bhubaneswar
c)	Contact Person, Address and Email	Dr Sudhansu Sekhar Sahoo Associate professor School of Mechanical Sciences OUTR, Bhubaneswar sudhansu@outr.ac.in
d)	RFP/Tender Document Fees	INR 10,000/- (Rupees Ten Thousand only)
e)	Earnest Money Deposit	INR 3,20,000/- (Rupees Three Lakh Twenty Thousand only)
f)	Selection Method	QCBS (70% Weightage on Technical and 30% Weightage on Commercial Evaluation)
g)	Tender Publish	02-01-2025 at 6.00 P.M.
h)	Query invitation	Upto 08-01-2025
i)	Pre-bid Meeting	10-01-2025 at 11.30.a.m. OUTR
j)	Tender Submission start date	11-01-2025
k)	Last date and time for Submission of proposals from Bidders	22-01-2025 at 6.00 p.m.
l)	Date and time for opening of Technical Proposals	24-01-2025 at 11.00 a.m.
m)	Date and time for Technical Presentation only for bidders who are declared qualified as per section 7.1 of the bid document	Will be intimated
n)	Date and time for opening of Commercial Bids	Will be intimated
o)	Bid Validity Period	180 Days
p)	Project Term	1 3 Years (Service and training at the COE) 2 Perpetual License

### 3. Request for proposal.

Proposals are invited through the e-Procurement portal from eligible, reputed System Integrators cum implementing agencies as Technology Partners (TP) for setting up a **CoE on Centre of Design and Computational Skilling (CDCS) for skill development & Research at OUTR**. This invitation for bidding is open to all bidders meeting the minimum eligibility criteria as mentioned in this RFP Document. However, the bidders must register themselves at the eProcurement portal of Odisha before participating in the tender process.

### 4. Structure of the RFP

This RFP document for setting up the Centre of Excellence consists of the following volumes:

#### Volume-I: Instructions to Bidder

The contents of this volume broadly cover the following areas:

- a) Project Background
- b) Instruction to Bidders
- c) Criteria for evaluation
- d) Award of Contract to System Integrator cum implementing agency as Technology Partner (TP)
- e) Formats for Pre-Qualification, Technical and Financial Bid Response.

#### Volume-II: Terms of Reference

The contents of this volume broadly cover the following areas:

- a) About the project and its objectives
- b) Scope of work
- c) Project Schedule
- d) Payment Terms and Schedule
- e) Timeline of Project Implementation
- f) Bill of Material and Quantity

### 5. Project Background

#### 5.1 Basic Information

OUTR, Bhubaneswar invites responses to this Request for Proposals (“RFP”) from reputed firms (“Bidders”) for the Selection of System Integrators cum implementing agencies as Technology Partner (TP) for setting up a Centre of Excellence on Centre of Design and Computational Skilling (CDCS) for skill development & Research & post **Implementation Support for Three (3) Years** at OUTR as described in the Vol-II “Terms of Reference” of this RFP/Tender.

Proposals must be received no later than the time, date, and venue mentioned in the Fact Sheet.

Proposals that are received late will not be considered in this procurement process.

OUTR will award the contract to the successful bidder whose proposal has been determined as the best value proposal based on Technical and Financial evaluation criteria and accepted by the Tender Accepting Authority.

#### 5.2 About OUTR

Odisha University of Technology and Research (OUTR) Bhubaneswar has been playing a significant role in the development of the state of Odisha by producing skilled graduates, conducting cutting-edge research, fostering entrepreneurship and start-ups, engaging in community outreach, and collaborating with leading industries. The university has a bright future ahead as it continues to strive for excellence in education and research. In line with the vision of OUTR, it is proposed to open a Centre of Excellence CoE on Centre of Design and Computational Skilling(CDCS), with a motive to enhance the research facility, and train the students to up skills in the areas of Simulation. The establishment of CoE is useful for the students of other Universities/Institutions and Odisha as a whole. Establishing a state-of-the-art skilling Centre of Excellence on the campus of OUTR would be a perfect & impactful step towards strengthening the vision of replicating the Odisha Government’s skill development initiatives in the entire state and country.

## 5.3 Project Profile

The major objective for the implementation of the Centre of Excellence is to achieve the following:

- a) Students of our University will have design and analysis and simulation of the real world complex problems related to Fluid Dynamics, Mechanical Structures, Electromagnetic Simulation, Thermal Simulation, Power Integrity, Embedded Software etc.
- b) This center will help to do research work in the field of Automotive, Aerospace and Defense, Consumer Goods, Electronics, Energy, Healthcare, Industrial Equipment and rotary machinery, Materials, Chemical Processing, Semi-conductors etc.
- c) To attract, train, and provide technical guidance to potential entrepreneurs and startups to facilitate and accelerate their entrepreneurial journey.
- d) To disseminate knowledge and technology by acting as a bridge between the academic and the business world.
- e) To create new job opportunities.
- f) Create a holistic ecosystem to support industry requirements.
- g) Partnership Certification Program to create the Skilled Workforce of today.
- h) Enhance Innovation - Access to the student for driving innovation for the

## 6. Instruction to the Bidders

### 6.1 General Information

- a) While efforts have been made to provide comprehensive and accurate background information, requirements, and specifications, Bidders must form their conclusions about the solution needed to meet requirements.
- b) The bidding documents will be downloaded from the University website i.e. [www.outr.ac.in](http://www.outr.ac.in) or can be seen at the e-Procurement portal '<https://tendersodisha.gov.in>'
- c) Interested firms shall submit the Bids in the prescribed format through scanned softcopy at the e-Procurement portal using their login credentials following the due procedure of the eProcurement. However, the bidders have to send the RPF/Tender cost and the EMD as DD to the **Registrar, Odisha University of Technology and Research (OUTR), Ghatikia, Bhubaneswar-751029, Odisha** so as to reach on or before the due date.
- d) All information supplied by bidders may be treated as contractually binding on the bidders, on the successful award of the assignment by OUTR based on this RFP.
- e) No commitment of any kind, contractual or otherwise shall exist unless and until a formal written contract has been executed by or on behalf of OUTR. Any notification of preferred bidder status by OUTR shall not give rise to any enforceable rights by the bidder.
- f) **OUTR may cancel this public procurement at any time before a formal written contract is executed by or on behalf of OUTR.**
- g) This RFP supersedes and replaces any previous public documentation and communications, and bidders should place no reliance and dependence on such communications.
- h) All amendments, time extensions, clarifications, etc. will be available at the eProcurement portal <https://tendersodisha.gov.in> as well as on the University website i.e. [www.outr.ac.in](http://www.outr.ac.in) and will not be published in newspapers. The bidders should regularly visit the above portal and website to keep themselves updated.

### 6.2 Compliant Proposals / Completeness of Response

- a) Bidders are advised to study all instructions, forms, terms, requirements and other information in the RFP documents carefully. Submission of the bid shall be deemed to have been done after careful study and examination of the RFP document with a full understanding of its implications.

- b) Failure to comply with the requirements of this paragraph may render the proposal non-compliant and the proposal may be rejected. Bidders must:
- Include all documentation specified in this RFP.
  - Follow the format of this RFP and respond to each element in the order as set out in this RFP.
  - Comply with all requirements as set out within this RFP.

### 6.3 Pre-Bid Meeting and Clarifications

#### 6.3.1 Pre-Bid conference

- a) OTR shall hold a pre-bid meeting either online or offline with the prospective bidders on 10.01.2025
- b) The queries for the pre-bid meeting may be sent by email to [sudhansu@otr.ac.in](mailto:sudhansu@otr.ac.in) on or before 08.01.2025.
- c) Any query after the due date and time specified above will not be entertained by OTR.
- d) The Bidders should submit their queries in writing in the format specified below before attending the pre-bid meeting. OTR shall not be responsible for queries received by it in any other format.

Sl No	RFP Document Reference(s) (Section & Page Number(s))	Content of RFP requiring Clarification(s)	Points of Clarification

- d) OTR shall not be responsible for any bidders' queries received by it in any other format. Any requests for clarifications post the indicated date and time mentioned will not be entertained by OTR.

#### 6.3.2 Responses to Pre-Bid Queries and Issue of Corrigendum

- a) The authorized person for OTR will endeavor to provide timely responses to all queries. However, OTR neither makes representation or warranty as to the completeness or accuracy of any response made in good faith nor does OTR undertake to answer all the queries that have been posed by the bidders.
- b) At any time before the last date for receipt of bids, OTR may, for any reason, whether at its initiative or in response to a clarification requested by a prospective bidder, modify the RFP document by corrigenda and/or addenda.
- c) The Corrigendum (if any) and clarifications to the queries from all Bidders will be posted on [www.otr.ac.in](http://www.otr.ac.in), eProcurement portal <https://tendersodisha.gov.in>
- d) Any such corrigenda and/or addenda shall be deemed to be incorporated into this RFP.
- e) To provide prospective bidders reasonable time for taking the corrigenda and/or addenda into account, OTR may, at its discretion, extend the last date for the receipt of proposals if required.

### 6.4. Key Requirements of the Bid

#### 6.4.1 Right to Terminate the Process

- a) OTR may terminate the RFP process at any time and without assigning any reason. OTR makes no commitment, express or implied, that this process will result in a business transaction with anyone.
- b) This RFP does not constitute an offer by OTR. The bidder's participation in this process may result in OTR selecting the bidder to engage in the execution of the contract.

#### 6.4.2 RFP Document Fees

The bidder must furnish along with its bid the required bid document fee amounting to ₹10,000 (Rupees Ten Thousand) only in the shape of DD in favor of **Odisha University of Technology and Research (OTR)**, drawn in any scheduled commercial bank and payable at **Bhubaneswar** failing which the bid will be rejected. **No waiver of document fee is allowed.** The bid is to be submitted online at the e-Procurement portal, whereas the DD towards the bid document fee is to be submitted through offline mode.

#### 6.4.3 Earnest Money Deposit



- a. **Bidders** shall submit, along with their Bids, EMD of Rs. 3,20,000/- (Rupees Three Lakhs and Twenty thousand) only in the shape of Demand Draft (in the format specified in Clause 9.1.5) issued by any scheduled bank in favor of **Odisha University of Technology and Research (OUTR)**, drawn in any scheduled commercial bank and payable at **Bhubaneswar**. The EMD in the shape of a DD should be submitted in the offline mode to reach the office of the Registrar before the due date.
- b. EMD of all unsuccessful bidders would be refunded by OUTR within 60 days of the bidder being notified as being unsuccessful. The EMD, for the amount mentioned above, of the successful bidder would be returned upon submission of the Performance Bank Guarantee.
- c. The EMD amount is interest-free and will be refundable to the unsuccessful bidders without any accrued interest on it.
- d. The bid/proposal submitted without EMD, mentioned above, will be summarily rejected.
- e. **The EMD may be forfeited:**

If a bidder withdraws the proposal or increases the quoted prices after the opening of the proposal and during the bid validity period or its extended period, if any.

- In case of a successful bidder, if the bidder fails to sign the agreement following the Terms & Conditions (including timelines for execution of the agreement) of this RFP or fails to furnish Performance Bank Guarantee following the Terms & Conditions (including timelines for furnishing Performance Bank Guarantee)
- If a bidder withdraws its bid during the period of bid validity.
- During the bid process, if a bidder indulges in any act that would jeopardize or unnecessarily delay the process of bid evaluation and finalization.
- If a bidder has been found to have indulged in any suppression of facts, furnishing of fraudulent statement, misconduct, or other dishonest or ethically improper activity, about this RFP.
- If a bidder's proposal contains deviations, conditional offers, and partial offers.

## **6.5 Submission of proposal**

### **6.5.1 Instruction to bidder for bid submission**

- a) The bidders must submit their bids as required in two stages through the eProcurement portal Stage-I "**Technical Bid**" and Stage-II "**Financial Bid**" through the BoQ in Excel format only. However, the RFP/Tender fee and EMD in the shape of DD to be submitted in offline mode via speed post/ Courier service to the Registrar, OUTR. The envelope containing the DDs must be mentioned at the top with the "**RFP Number & Date**" and the **due date and time of submission** as mentioned in the Tender Call Notice.

#### **Stage I (Technical Bid)**

The technical bid shall detail the technical specifications of the proposed solution, compliance to the specifications of various modules detailed in the RFP/Tender document, implementation plan, post-implementation warranty, and support plan along with the Checklist for Technical Bid, supporting documents such as certificate of incorporation, Memorandum of Association, copy of PAN, GST certificate, work order copy/ experience certificates, IT returns of last 3 years audited account statements, bidders profile, and other requisite documents. Any other relevant papers that a bidder feels necessary along with the Terms and Conditions duly signed and accepted by the bidder shall form part of this technical bid.

#### **Stage II (Financial Bid)**

The Financial bid shall give a detailed breakup of price in INR of various modules, taxes, and other work as per the proforma in the BoQ and the financial bid shall include cost towards the year-wise maintenance charges in INR for a total duration of the project years after the free warranty/maintenance period.

The Financial Proposal/Commercial bid / BoQ format is provided as BoQ\_XXXX.xls along with this tender document/RFP at the e-tender portal with the concerned tender. Bidders are advised to download this BoQ\_XXXX.xls as it quotes their offer/rates in the permitted column and upload the same in the commercial bid offering the detailed technical specifications. The bidder shall not tamper/modify the downloaded price bid template in any manner. In case the same is found to be tempered/modified in any manner, the tender will be completely rejected and EMD will be forfeited and the tenderer is liable to be banned from doing business.

The bidder must ensure to quote rate of each item. The column meant for quoting rate in figures appears in SKY BLUE color. While selecting any of the cells a warning appears to mandatorily fill all such cells with any value, including "0" (ZERO) or specified values.

### **6.5.2 Tender Validity**

Proposals shall remain valid for **180 Days** from the date of opening of the pre-qualification and technical proposals. OUTR reserves the right to reject a proposal valid for a shorter period as non-responsive and will make the best efforts to finalize the selection process and award the contract within the bid validity period. The bid validity period may be extended on mutual consent if felt necessary.

### **6.5.3 Submission and Opening of Proposals**

a) The bidders should submit their responses as per the format given in this RFP/Tender document in the following manner:

#### **Stage-I**

- i) **Response to Pre-Qualification Criteria**
- ii) **Technical Proposal**

The Technical bid shall detail the technical specifications of the proposed solution, compliance to the specifications of various modules detailed in the RFP/Tender document, implementation plan, post-implementation warranty and support plan along with the Checklist for Technical Bid, supporting documents such as certificate of incorporation, memorandum of Association, copy of PAN, GST certificate, work order copy/ experience certificates, IT returns of last 3 years audited account statements, bidders profile and other requisite documents must be signed with appropriate authority with seal and to be uploaded at the e-Procurement portal login credential of corresponding bidders. Any other relevant papers that a bidder feels necessary along with the Terms and Conditions duly signed and accepted by the bidder may also be uploaded.

#### **Stage-II**

- iii) **Commercial Proposal as per 6.5.1 of stage-II**

b) Please Note that Prices should not be indicated in the Pre-Qualification Response or Technical proposal but should only be indicated in the Commercial Proposal.

### **6.5.4 Late Bids**

- a) The bidders are advised to submit their bids much before the prescribed date and time.
- b) The bids submitted by any other means like physical submission/telex/telegram/fax/e-mail etc. shall not be considered. No correspondence will be entertained on this matter.
- c) OUTR reserves the right to modify and amend any of the above-stipulated conditions/criteria depending upon project priorities and needs vis-à-vis urgent commitments.

### **6.5.5 Proposal Preparation Costs**

The bidder shall be responsible for all costs incurred in connection with participation in the RFP/Tender process, including, but not limited to, costs incurred in the conduct of informative and other diligence activities, participation in meetings or discussions or presentations, preparation of the proposal, in providing any additional information required by OUTR to facilitate the evaluation process, and in negotiating a definitive contract or all such activities related to the bid process.

OUTR will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

### **6.5.6 Language**

The Proposal should be filled by the Bidder in English language only. If any supporting documents submitted are in any language other than English, translation of the same in the English language is to be duly attested by Bidders. For purposes of interpretation of the Proposal, English translation shall govern.

### **6.5.7 Acceptance and Rejection of Bids**

OUTR reserves the right to reject in full or part, any or all bids without assigning any reason thereof. OUTR reserves the right to assess the Bidder's capability and capacity. The decision of OUTR shall be final and binding. The bid should be free of overwriting, and properly scanned. All measures, corrections, or additions must be written both in words and figures and attested. Offers not submitted in the prescribed manner or submitted after the due date and time are liable to rejection.

## **6.6 Evaluation Process**

- a) OUTR will constitute a Proposal Evaluation Committee to evaluate the responses of the bidders.
- b) The Proposal Evaluation Committee constituted by OUTR shall evaluate the responses to the RFP/Tender and all supporting documents/documentary evidence. Inability to submit requisite supporting documents/documentary evidence may lead to rejection of the bid.
- c) The decision of the Proposal Evaluation Committee in the evaluation of responses to the RFP/Tender shall be final. No correspondence will be entertained outside the process of negotiation/ discussion with the Committee.
- d) The Proposal Evaluation Committee may ask for meetings with the Bidders to seek clarifications on their proposals if required.
- e) The Proposal Evaluation Committee reserves the right to reject any or all proposals based on any deviations.
- f) Each of the responses shall be evaluated as per the criteria and requirements specified in this RFP/Tender document.
- g) Initial bid scrutiny will be held, and incomplete details as given below will be treated as nonresponsive if proposals are:
  - i) Not submitted as specified in the RFP document
  - ii) Received without the Letter of Authorization (Power of Attorney)
  - iii) Found with suppression of details
  - iv) Found with incomplete information, subjective, conditional offers and partial offers submitted
  - v) Submitted without the documents requested in the checklist
  - vi) Submitted with a lesser validity period
  - vii) All responsive Bids will be considered for further processing as below:

## **7. Criteria for Evaluation**

Bidders who satisfy the Prequalification criteria mentioned below will be eligible for the next stage of evaluation. Technical Proposal and Commercial Proposal of Bidders who do not meet the Pre-Qualification criteria will not be opened in the portal.

The technical score of all the bidders would be calculated as per the criteria mentioned below. Bidders who achieve at least **70 Marks** or more in the technical evaluation would be eligible for the next stage, i.e. Commercial Bid opening.

Bidders should submit supporting documentary evidence in the absence of which their proposals will be summarily rejected.

## 7.1 Pre-Qualification Criteria (for the bidder)

Sl No	Basic Requirement	Specific Requirement	Documents required
(a)	Legal Entity	The responding bidder should be: <ul style="list-style-type: none"> <li>Registered as a Company / LLP under the Companies Act, 1956/2013 <b>OR</b> Partnerships Firm registered under LLP Act, 2008.</li> <li>Registered with Goods and Services Tax Network (GSTN).</li> <li>Company in operation for last ten (10) years as on date of bid submission date</li> </ul>	<ul style="list-style-type: none"> <li>Copy of Certificate of Incorporation / Registration in India</li> <li>Copy of GST Registration Certificate</li> <li>Copy of the work order / Completion certificate as documentary proof of 10 years in operation</li> </ul>
b)	Sales Turnover	The average sales turnover of the bidder must be INR 50 Crore in the last three financial years ending on 31 <sup>st</sup> March 2024.	<ul style="list-style-type: none"> <li>Copy of audited Profit &amp; Loss Statement OR</li> <li>Certificate from the statutory auditor</li> </ul>
c)	Net Worth	The bidder must be made a profit and positive net worth in the last three financial years ending on 31 <sup>st</sup> March 2024.	Certificate from the statutory auditor
d)	Training Expertise	The bidder should be a company working in the field of Hardware/software implementation/automation software implementation for at least five(05) years	PO, Sign off copy/Satisfactory working certificate/ Payment Invoice
e)	Certifications	The bidder should have the following certifications with validity: <ul style="list-style-type: none"> <li>ISO/IEC 27001-2013</li> <li>ISO/IEC 9001</li> </ul>	Copy of certificate issued by accredited organizations.. Bidder must provide OEM (Ansys) Authorization certificate. - Without OEM(Ansys) Authorized Certificate Bidder will be considered invalid.
f)	Technical Capability	The Bidder should have completed at least following similar Projects in India during the last 3 years as on the bid submission date and value specified below: <ul style="list-style-type: none"> <li>1 project not less than 2 Cr. Implemented OR</li> <li>2 projects not less than 1 Cr. Implemented each</li> </ul>	PO, Sign off copy/Satisfactory working certificate/ Payment Invoice

g)	Black listing	The bidder must not be currently under declaration of ineligibility for corrupt and fraudulent practices or blacklisted/debarred by the Central Government or any State Government organization/department / PSU in India at the time of submission of the bid	Self-declaration in this regard by the authorized signatory of the bidder on the company letterhead (as per the template provided in this RFP document)
h)	Local Presence	The bidder should have been in existence for at least 10 years in India	The Certificate of Incorporation of the bidder should be submitted and must have a registered office in India.
i)	Power of Attorney for Authorized Signatory	The bidder shall submit Power of Attorney, duly authorizing the person signing the documents to sign on behalf of the bidder and thereby binding the bidder.	Power of Attorney document
j)	Original Equipment Manufacturer Authorization Form	The bidder should submit an OEM MAF as part of the bid submission	Original Equipment Manufacturer (OEM) Authorization Form in OEM Letter Head as per the template in this tender.
k)	RFP Document Fees	Rs10,000/-	In the shape of a Bank Draft
l)	Earnest Money Deposit	Rs 3,20,000/-	In the shape of a Bank Draft

## 7.2 Technical Evaluation Criteria

Technical proposals of those bidders will be opened and evaluated, according to who qualifies the Pre-Qualification criteria. The Evaluation Committee will evaluate the Technical Proposals based on the technical evaluation criterion as provided below:

S.N o.	Technical Parameters	Marks	Self Assessment Marks	Committee Evaluation Marks
1	<p>Average Annual Turnover of the Bidder during the last three (3) financial years (FY 2021-22, 2022-23 &amp; 2023-24)</p> <p>&gt;= INR 80 Crores : 10 (marks)            &gt;= INR 60 Crores and &lt; INR 80 Crores : 07 (marks)            &gt;= INR 50 Crores and &lt; INR 60 Crores : 04 (marks)</p>	10		
2	<p>The value of work done by the bidder in the implementation of COEs/ MOUs/MOAs/ similar kinds of solutions in different Countries/States/ Central Education boards/ universities/ Autonomous Institutes, during the last 3 Financial Years (FY 21-22 onwards).</p> <p>&gt;= INR 2 Crores: 10 (marks)            &gt;= INR 1 Crores and &lt; INR 2 Crores: 07 (marks)</p>	10		
3	<p>A: (ISO 29990:2010/ ISO 21001:2018/ ISO 29993:2017/ upgraded version) and            B: ( ISO 9001:2015/ upgraded version) Certification of the Bidder/</p> <p>Certified both A and B : 10 (marks)            Certified anyone of A and B : 05 (marks)</p>	10		
4	<p>Bidder's experience in the implementation of COEs/ MOUs/MOAs/ similar kinds of solutions in different countries/States/ Central Education boards/ universities/ Autonomous Institutes, during the last 3 Financial Years (FY 21-22 onwards).</p> <p>&gt;= 10 nos. : 15 (marks)            &gt;= 5 and &lt;10 nos. : 12 (marks)            &gt;=3 and &lt;5 nos. : 10 (marks)            &lt;= 2 nos. : 05 (marks)</p> <p><b>*With the experience of CoE abroad, 05 marks will be added, based on the profile of work executed as per the decision by the committee.</b></p>	20		
5	<p>The total average number of students/ trainees per year, in three Universities/Institutes (State/Central Government Institutes/ abroad), where the proposed solution has been implemented, during the last three years</p> <p>&gt;= 1000 student Users: 15 (marks)            &gt;= 500 student Users and &lt;1000 student Users: 12 (marks)            &gt;= 500 student Users and &lt; 200 student Users: 09 (marks)            &lt; 200 student Users: 06 (Marks)</p> <p>The bidder should submit relevant documents to evaluate</p>	15		

6	Worldwide course certification Expert Trainers of the Bidder in the respective domain as per the requirements in the RFP who may be deputed at OUTR  More than 5 nos.: 10 (marks) >=2 and <=5: 07 (marks) Less than 2: 03 (marks) Bidder to submit the indicative CV of the certified expert trainers	10		
7	Technical Specification as given in RFP, Technical Presentation on approach and methodology, Demonstration of firm's own developed solution (currently in use by some clients) having functions as per the requirements in the RFP.	25		
	Total	100		

- a) Bidders who secure a Technical Score of at least **70 Marks** or more will be declared as technically qualified.
- b) The bidder with the highest technical bid (H1) will be awarded a 100% score.
- c) Technical Scores for other than H1 bidders will be evaluated using the following formula:  

$$T_n = \left\{ \frac{\text{Technical Bid score of the Bidder}}{\text{Highest technical evaluation marks}} * 100 \right\} \% \text{ (Adjusted to two decimal places)}$$
- d) The commercial bids of only the technically qualified bidders will be opened for further processing.

### 7.3 Evaluation of Commercial Bids

- a) The Commercial Bids of technically qualified bidders (i.e. Bidders with at least **70 Marks** or more in Technical Evaluation) will be opened on the prescribed date in the presence of bidder representatives.
- b) Only fixed-price financial bids indicating the total price for all the deliverables and services specified in this bid document will be considered.
- c) Any conditional bid would be rejected.
- d) Errors & Rectification: Arithmetical errors will be rectified on the following basis: "If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If there is a discrepancy between words and figures, the amount in words will prevail. If the bidder does not accept the correction of an error, its bid will be rejected".
- e) If there is no price quoted for a certain material or service, the bid shall be declared as disqualified.
- f) If 2 or more bidders have the same value in the commercial bid, the bidder securing the highest technical score will be adjudicated as "Best responsive bid" for the award of the Project.
- g) The bidder with the lowest qualifying financial bid (L1) will be awarded a 100% score. Financial scores for other bidders will be evaluated using the following formula:  

$$F_n = \left\{ \frac{\text{Financial Bid of L1}}{\text{Financial Bid of Bidder}} * 100 \right\} \%$$

### 7.4 Final Evaluation of Bids

- a) The technical and financial evaluation scores secured by each bidder will be added using weights of 70% and 30% respectively to compute the composite score. The composite score will be computed as under:  

$$B_n = 70\% * T_n + 30\% * F_n$$
- b) The bidder securing the highest composite score will be adjudicated as the most responsive bidder for the award of the project.
- c) The composite score of the Bidders for the bid shall be worked out as under:



Bidder Name	Technical Score	Financial Score	Weighted Technical Score (70% of B)	Weighted Financial Score (30% of C)	Composite Score (F=D+E)

## 8. Award the contract to the System Integrator cum Implementing agency as Technology Partner (TP)

### 8.1 Award Criteria

OUTR will award the Contract to the successful bidder whose proposal has scored the highest composite score and would consider it as substantially responsive as per the process outlined above.

### 8.2 Right to Accept Any Proposal and To Reject Any or All Proposal(s)

OUTR reserves the right to accept or reject any proposal, and to annul the tendering process/ public procurement process and reject all proposals at any time before the award of the contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for OUTR action.

### 8.3 Purchaser's Procurement Rights

Without incurring any liability, whatsoever to the affected bidder or bidders, the Purchaser reserves the right to:

- a) Amend, modify, or cancel this tender and reject any or all proposals without assigning any reason.
- b) Change any of the scheduled dates stated in this tender.
- c) Reject proposals that fail to meet the tender requirements.
- d) Exclude any of the module(s)
- e) Remove any of the items at the time of placement of the order.
- f) Increase or decrease no. of resources supplied under this project. Should the Purchaser be unsuccessful in negotiating a contract with the selected bidder, the Purchaser will begin contract negotiations with the next best-value bidder to serve the best interest.
- g) Make typographical corrections or correct computational errors in proposals
- h) Request bidders to clarify their proposal

### 8.4 Notification of Award

Before the expiration of the proposal validity period, OUTR will notify the successful bidder in writing or email or through the eProcurement portal, that its proposal has been accepted. In case the tendering process/public procurement process has not been completed within the stipulated period, OUTR may like to request the bidders to extend the validity period of the bid.

The notification of the award will constitute the formation of the Contract. Upon the successful bidder's furnishing of the Performance Bank Guarantee (PBG), OUTR will notify each unsuccessful bidder and return their EMD.

### 8.5 Contract Finalization and Award

OUTR may also like to reduce or increase the quantity of any item in the Scope of Work defined in the RFP. Accordingly, the total contract value may change based on rates defined in the financial proposal.

## 8.6 Performance Guarantee

- a) OUTR will require the selected bidder to provide a Performance Bank Guarantee (PBG), within 15 days from the date of notification of award.
- b) PBG would be 3% of the cost of the annual payout and should be valid for 24 months. Each year the System Integrator should submit the fresh PBG accordingly or extend the PBG.
- c) The selected bidder shall be responsible for extending the validity date and claim period of the Performance Guarantee as and when it is due on account of non-completion of the service during the work order period.
- d) In case the selected bidder fails to submit a performance guarantee within the time stipulated, OUTR at its discretion may cancel the order placed on the selected bidder and/or forfeit the EMD after giving prior written notice to rectify the same. OUTR shall invoke the performance guarantee in case the selected bidder fails to discharge their contractual con during the period or OUTR incurs any damages due to the bidder's negligence in carrying out the project implementation as per the agreed terms & conditions.

## 8.7 Signing of Contract

After OUTR notifies the successful bidder that its proposal has been accepted, OUTR shall enter into a contract with the successful bidder (prime bidder in case of a consortium), incorporating all clauses, pre-bid clarifications and proposal of the bidder.

## 8.8 Failure to Agree with the Terms and Conditions of the RFP

Failure of the successful bidder to agree with the draft legal agreement and Terms & Conditions of the RFP shall constitute sufficient grounds for the annulment of the award, in which event OUTR may call for new proposals from the interested bidders. In such a case, OUTR shall invoke the PBG of the successful bidder.

## 8.9 Penalties for the delay in Implementation

SI No	Activity	Timeline	Penalty
1.	Delay in Procurement of Hardware/Equipment	As per the Delivery / Project Implementation schedule mentioned in this Document	<ul style="list-style-type: none"> <li>✓ 0.25% of Contract value of delayed item per week or part thereof for delay in delivery (max up to 2 % of Contract value)</li> <li>✓ If the successful bidder delays the delivery/supply beyond 60 days from the scheduled date of delivery as per the project implementation timeline then the contract may be terminated and forfeit the PBG.</li> </ul>
	Delay in Completion of System Integration (resulting in a delay in commencement of services like skill development training programs, and support to startups & entrepreneurs)	-Do-	<ul style="list-style-type: none"> <li>✓ 0.25% of the Contract value of the delayed item per week or part thereof for delay in Implementation (max up to 2 % of Contract value)</li> <li>✓ If the successful bidder delays the installation and commissioning beyond 120 days from the scheduled date of installation and commissioning as per the project implementation timeline then the contract may be terminated and Forfeit the PBG.</li> </ul>

## 9. Formats for Response

### 9.1 Pre-Qualification Bid Formats

#### 9.1.1 FORM PQ-1: Cover Letter (To be submitted on the Letterhead of Bidder)

To  
The Registrar  
ODISHA UNIVERSITY OF TECHNOLOGY AND RESEARCH  
Ghatikia, Mahalaxmi Vihar,  
Bhubaneswar- 751029 Odisha, India

#### **Sub: Invitation of Bids for setting up a Centre of Excellence on skill development/research / Consultancy**

Ref: RFP No. OUTR-.....

Madam/Sir,

I, the undersigned, offer to provide the services for the proposed assignment concerning your RFP No..... We hereby submit our proposal which includes the pre-qualification proposal, technical proposal and commercial proposal, sealed under separate envelopes. Our proposal will be valid for acceptance up to **180 Days** and I confirm that this proposal will remain binding upon us and may be accepted by you at any time before this expiry date.

All the information and statements made in our proposal are true and correct and I accept that any misinterpretation contained in it may lead to disqualification of our proposal. If negotiations are held during the period of validity of the proposal, I undertake to negotiate based on a proposal submitted by us. Our proposal is binding upon us and subject to the modifications resulting from contract negotiations.

I have examined all the information provided in your Request for Proposal (RFP) and offer to undertake the service described following the conditions and requirements of the selection process. I agree to bear all costs incurred by us in connection with the preparation and submission of this proposal and to bear any further pre-contract costs. In case, any provisions of this RFP/ ToR/Scope including our technical and financial proposal are found to be deviated, then you shall have the right to reject our proposal. I confirm that I have the authority to submit the proposal and to clarify any details on its behalf.

I understand you are not bound to accept any proposal you receive.

Yours faithfully, (Authorized  
Signatory)  
Name, Designation & Contact No. and Seal

### 9.1.2 FORM PQ-2: Bidder's Organization (General Details)

(To be submitted on the Letterhead of Bidder)

Sl. No.	Information	Details
a	Name of Bidder	
b	Registered Address of Bidder	
c	Address for Communication	
d	Address of local office in Odisha. If the bidder has no local office at the time of bid submission, an undertaking has to be furnished on the bidder's letterhead on setting up an office within 3 months from issuance of the work order.	
e	Name, Designation and Address of the contact person to whom all references shall be made regarding this RFP	
f	Mobile no. of contact person:	
g	E-mail address of contact person:	
h	GST Number of the Firm	
i	PAN No. of the firm	

Yours faithfully,

(Authorized Signatory)  
Name, Designation & Contact No.  
Seal

**9.1.3 FORM PQ-3: Acceptance of Terms and Conditions**

(To be submitted on the Letterhead of Bidder)

To  
The Registrar  
ODISHA UNIVERSITY OF TECHNOLOGY AND RESEARCH  
Ghatikia, Mahalaxmi Vihar,  
Bhubaneswar- 751029 Odisha, India

**Sub:** .....

Ref: RFP No. ....

Madam/Sir,

I have carefully and thoroughly gone through the Terms & Conditions along with the scope of work contained in the RFP No. ....regarding RFP for System Integrators cum implementing agencies for setting up of a Centre of Excellence on skill development on emerging technologies cum a startup accelerator.

I declare that all the provisions/clauses including the scope of work of this RFP are acceptable to our company. I further certify that I am an authorized signatory of the company and I am, therefore, competent to make this declaration.

Yours faithfully,

(Authorized Signatory)  
Name, Designation & Contact No.  
Seal

#### 9.1.4 FORM PQ-4: Project Citation Format

a)	Project Name:	
b)	Value of Contract/ Work Order (In INR):	
c)	Name of the Client:	
d)	Project Location:	
e)	Contact person of the client with address, phone and e-mail:	
f)	Project Duration:	
g)	Start Date (month/year): Completion Date (month/year):	
h)	Status of assignment: Completed / Ongoing (if it is ongoing, level of completion)	
i)	Narrative description of the project with scope:	
j)	List of Services provided by your firm/company:	

### 9.1.5FORM PQ-5: Bank Guarantee Template

To  
The Registrar  
ODISHA UNIVERSITY OF TECHNOLOGY AND RESEARCH  
Ghatikia, Mahalaxmi Vihar,  
Bhubaneswar- 751029 Odisha, India

Whereas <<Name of the bidder>> (hereinafter called 'the Bidder') has submitted the bid for Submission of RFP No. \_\_\_\_\_ dated \_\_\_\_\_ for Selection of Software Solution Provider for <<Project Name as per RFP>> (hereinafter called "the Bid") to OUTR.

Know all men by these presents that we <<Name of the Bidder>> having our office at <<Address>> (hereinafter called "the Bank") are bound unto the <<Nodal Agency>> (hereinafter called "the Purchaser") in the sum of Rs. <<Amount in figures>> (Rupees <<Amount in words>> only) for which payment well and truly to be made to the said Purchaser, the Bank binds itself, its successors and assigns by these presents. Sealed with the Common Seal of the said Bank this <<Date>>

The conditions of this obligation are:

- a) If the Bidder has its bid withdrawn during the period of bid validity specified by the Bidder on the Bid Form; or
- b) If the Bidder, having been notified of the acceptance of its bid by the Purchaser during the period of validity of a bid
  - i) Withdraws his participation from the bid during the period of validity of the bid document; or
  - ii) Fails or refuses to participate in the subsequent Tender process after having been shortlisted.

We undertake to pay to the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to <<insert date>> and including <<extra time over and above mandated in the RFP>> from the last date of submission and any demand in respect thereof should reach the Bank not later than the above date.

NOTWITHSTANDING ANYTHING CONTAINED HEREIN:

- a) Our liability under this Bank Guarantee shall not exceed Rs. <<Amount in figures>> (Rupees <<Amount in words>> only)
- b) This Bank Guarantee shall be valid up to <<insert date>>)
- c) It is a condition of our liability for payment of the guaranteed amount or any part thereof arising under this Bank Guarantee that we receive a valid written claim or demand for payment under this Bank Guarantee on or before <<insert date>>) failing which our liability under the guarantee will automatically cease.

Yours faithfully,

(Authorized Signatory) Name,  
Designation & Contact No.  
Seal

**9.1.6 FORM PQ-6: Manufacturer's Authorization Form (MAF)**

(To be submitted on the Letterhead of Bidder)

To  
The Registrar  
ODISHA UNIVERSITY OF TECHNOLOGY AND RESEARCH  
Ghatikia, Mahalaxmi Vihar,  
Bhubaneswar- 751029 Odisha, India

**Sub: Issue of the Manufacturer's Authorization Form (MAF) for setting up a Centre of Excellence on skill development /Research / Consultancy**

Ref: RFP No: .....

Madam/Sir,

We {name and address of the OEM} who are established and reputed original equipment manufacturers (OEMs) having offices at {addresses of office location} do hereby authorize <<Name of the Firm/Company/Organization>> who is our{Distributor/ Channel Partner/ Retailer/ Others <please specify>} to bid, negotiate and conclude the contract with you against the aforementioned reference for the following Software manufactured by us:

{OEM will mention the details of all the proposed product(s) with their make/ model.}

We undertake to provide OEM Support / Warranty for the offered Software, as mentioned above, for <please specify as per Tender requirements> Years.

We hereby confirm that the offered Software is not declared as End-of-Service/ Support on the date of bid submission and complies with the technical specifications mentioned in this Tender.

Yours faithfully,

(Authorized Signatory)  
Name, Designation & Contact No.  
Seal



### 9.1.7 FORM PQ-7: Format for Non-blacklisting Declaration

(To be submitted on the Letterhead of Bidder)

To

The Registrar  
ODISHA UNIVERSITY OF TECHNOLOGY AND RESEARCH  
Ghatikia, Mahalaxmi Vihar,  
Bhubaneswar- 751029 Odisha, India

**Sub: Non-Blacklisting declaration in connection with RFP No: .....**

Madam/Sir,

This is to notify you that our <<Name of the Firm/Company/Organization>> is not declared ineligibility for corrupt and fraudulent practices or blacklisted/debarred by the Central Government or any State Government organization/department / PSU in India at the time of submission of the bid.

Yours faithfully,

(Authorized Signatory)  
Name, Designation & Contact No.  
Seal

## **9.2 Technical Bid Formats**

### **9.2.1 FORM TECH-1: Description of Proposed Solution**

*[Along with Technology, Scalability, Completeness, Simplicity and Interoperability]*

Bidder has to provide details of the entire solution proposed, along with its key differentiators, covering all requirements as listed in Volume II of this RFP.

Bidder has to specifically include (but not be limited to) a diagram and detailed description of the following:

- a) Complete Scope of Work
- b) Training Methodology
- c) Proposed Support plan
- d) Industry Connect Support
- e) Any other relevant parameters to make the CoE Efficient & Effective

Bidder must cover all aspects of the solution while showcasing its scalability, completeness, simplicity, and interoperability.

### **9.2.2 FORM TECH-2: Description of Proposed Approach & Methodology**

Bidder is free to propose any type of approach for development and implementation of Issue of the Manufacturer's Authorization Form (MAF) for System Integrators cum implementing agencies for setting up of a Centre of Excellence on skill development on emerging technologies cum a startup accelerator Ref: RFP No: OUTR/CoE/Mech/21 dated .02/01/2025

### 9.3. TECH-3: Detailed Work Plan

*[with Activities, Duration, Sequencing, Interrelations, Milestones and Dependencies]*

Sl. No.	Deliverable/ Activity*	Months									
		1	2	3	4	5	6	7	8	9	10
A											
B											
C											
D											
E											
F											
G											
H											
i											

**Financial Bid**

**9.3.1 FORM FIN-1: Financial Bid Covering Letter**

(To be submitted on the Letterhead of Bidder)

To  
The Registrar  
ODISHA UNIVERSITY OF TECHNOLOGY AND RESEARCH  
Ghatikia, Mahalaxmi Vihar,  
Bhubaneswar- 751029 Odisha, India

**Sub:** .....

**Ref: RFP No:** .....

Madam/Sir,

I /We, the undersigned, offer to provide the service for the development and implementation of Issue of the Manufacturer's Authorization Form (MAF) for System Integrators cum implementing agencies for setting up a Centre of Excellence on skill **development on .....** **Ref: RFP No: .....** and our Pre-Qualification, Technical and Financial Proposals. Our attached Financial Proposal is for the sum of <<Amount in words and figures>> exclusive of all applicable taxes and duties.

a) BID PRICE

We declare that our Bid Price is for the entire scope of the work as specified in the RFP. These prices are indicated in the Financial Bid as part of this RFP response. In case there is a substantial difference between the component-wise price approved by OTR and the price quoted by the bidder, OTR will have the right to ask the bidder to realign their prices without impacting the total bid price. We hereby agree to submit our offer accordingly.

b) PERFORMANCE BANK GUARANTEE

We hereby declare that in case the contract is awarded to us, we shall submit the Performance Bank Guarantee as specified in this RFP document.

We understand you are not bound to accept any Proposal you receive. We hereby declare that our Proposal is made in good faith, without collusion or fraud and the information contained in the proposal is true and correct to the best of our knowledge and belief.

We understand that our proposal is binding on us and that you are not bound to accept any proposal you receive.

Yours faithfully,

(Authorized Signatory)  
Name, Designation & Contact No. and Seal

### 9.3.2 FORM FIN-2: Financial Quote (Break-up)

As per BoQ available at e-Procurement Portal

## Volume-II: Terms of Reference

### (a) About the project and its objectives

The CoE should bridge the skill gap of industries help in fulfilling the needs and impart state-of-the-art industry-oriented training to help foster significant innovation and learning in the Technical Education and Industrial segment. It should also give exposure to the state-of-the-art technologies prevailing in Industry to the students, faculty members & Professionals. It should also assist the institute (Academic/Industrial) in bridging the industry-institute connection. The mission of the Centre of Excellence is to promote the implementation and advancement of knowledge in the domains of Product Innovation, Manufacturing Process & Production, and Digital & Innovative Manufacturing, through research and education partnerships with the industry. The following key points must be addressed in the proposed CoE:

- a) The Centre is being set up to conduct Industry-connected skill development programs, Industrial Consultancy, and industry-focused Research and Development projects. It would be necessary to sign a MoA with the Original Equipment Manufacturer (OEM) and Technology Partner (TP) which will be selected after completion of the bidding process.
- b) This Centre should be in Build, Operate, and Transfer Mode.
- c) The software should not be restricted to educational limits. It should be equipped with industrial features allowing the Institute to offer Industrial consultancy and research as well, apart from skill development.
- d) The Technology partner (TP) for executing the CoE in terms of installation of software and running the Centre on a day-to-day basis. However, the identities of the Technology Partners should be specified.

### (b) Scope of work

i) The overall plan, as part of this program, is to encourage a TP to set up a Centre of Excellence (CoE) on Centre of Design and Computational Skill (CDCS). The CoE is being set up to offer an interrelated high technology, modular, skilling facility, and offers demand-driven courses.

ii) The CoE, to be designed by the Technology Partner (TP), is envisioned to be set up as a state-of-the-art Centre of Excellence (CoE) in which the Technology Partner (TP) brings in their best-in-class equipment/ tools/ machines/ simulators (commonly referred to as equipment) to be used for training purposes. The CoE will be located in an appropriate space offered by OUTR. The CoE will be managed professionally by the TP. The infrastructure (Building space) for the CoE will be provided by OUTR as per the specifications given by the TP.

iii) The CoE will run under the overall operational management of the TP and the University. The Technology Partner under the Guidance of the OEM will be responsible for devising and implementing a five-year rolling plan and ensuring that the CoE is constantly upgraded and provides a high-technology ecosystem for skilling/up-skilling/ re-skilling/ cross-skilling and multi-skilling. The Technology Partner (TP), will be expected to mobilize students for training which will help generate revenues at the CoE which can help offset the overall costs of the CoE.

iv) Overall administrative, quality, and financial responsibilities including the management of the CoE, marketing, branding, placement, course content, pedagogy, etc. will be the responsibility of the Technology Partner. The Technology Partner may engage with, invite, and sign MoUs with industries (such as equipment manufacturers, software developers, and tool and device manufacturers that service the sector) and continuously engage with the industries to ensure that the CoE remains relevant at all times.

Along with the enablement of a state-of-the-art CoE at the OUTR campus, the following outcomes will be visible within a short period.

Complete learning solutions that will build specific skill sets and equip students with employable skills in conventional as well as innovative technologies

· Improved faculty & staff competency at OUTR

· Promote Industry-academia partnership

· Updated technical education curriculum that is more aligned with industry needs

- Improved employability which is mutually beneficial to the students proposed to be trained as well as the industry
- Partnership Certification programs to create a Skilled Workforce of cutting-edge Technology
- CoE within the University will have access to various best-in-class machines with hands-on experience for the students
- Comprehensive training – Training of academia, Training the trainers in academia, training the working professionals from private and government sectors.
- Project-based learning in collaboration with industry
- Develop Programs to support on-the-job training, live project demonstration, and relevant engineering projects
- Create a holistic ecosystem to support industry requirements
- Enhance Innovation - Access to the Student for driving innovation; Be Creative, be experimental; Learning by Providing services to industry to solve Industry 4.0 challenges

### **Startup Accelerator Program**

The purpose of a startup accelerator is to accelerate a startup's growth. It should be a mentor-based program that will provide intensive guidance, support, and structure for a set period, typically three months to six months.

The bidder should propose startup accelerators that can provide funding, thereby covering early-stage business expenses as well as travel for the three to six-month residency at the startup accelerators. The Startup accelerator program should offer:

- a)Startup accelerators should provide critical connections/ networking.
- b) Startup accelerators should provide technical and business mentoring.
- c)Startup accelerators will create an environment for business growth
- d) Providing physical space along with labs as an add-on feature.
- e)Access to Investors (VC, Angel, etc.)
- f)Access to support from large corporations.

The accelerator program should target to reach out to a large part of the State's Universities and Institutions (both public and private) in successfully inviting startups and student groups to meaningfully engage with the accelerator for their growth. The Bidder must present a long-term plan for the Startups Accelerator initiative with realistic outcomes in terms of some startups incubated at the center. The bidder should also present a plan for the number of startups to be supported during the project along with the areas of technologies that the accelerator program will support.

### **Warranty & Maintenance**

The selected bidder shall carry out warranty & maintenance of all the new hardware & software listed in the BOM-1 & BOM-2 for 5 years from the date of go-live of the CoE. During this phase, the selected bidder shall be responsible for the following;

- a)Replace/repair the defective hardware items.
- b)Provide necessary support for software maintenance

**(c) Expected Project Timeline & Payment Terms**

Payment will be released to the successfully shortlisted bidder in a phased manner as stated below:

Deliverables/Milestones	Timelines	Payment	Remarks
Tender Award	T0	i) 100% Payment against successful delivery & installation of the Software.  ii) For Trainer payment will be made quarterly on reimbursement mode	Award of Tender to the selected bidder and issuance of LOI.
Agreement	T0 +1Month		Completion of Agreement signing and award of Purchase Order
Inception Report / Resource Mobilization	T0 + 1Month		Submission of complete BOM with unit number and cost along with vendor name, model, AMC details & others
Completion of Procurement	T0 + 1Months		Completion of procurement of all SW for the operations of the Center and submission of invoice with the BOM.
Delivery & Installation	T0 + 1 Months		Completion of Delivery & Installation of software.
Final Acceptance Test & Go- Live. Engagement of the Operation & Maintenance team	T0 + 1 Month		Successful demonstration & running of the procured software modules

**Note:** - All the payments will be made to the successful bidder in Indian Rupees only. Payments will be made after at least thirty (30) days of receiving the invoice subject to approval from competent authority. The Invoice has to be raised in the name of **ODISHA UNIVERSITY OF TECHNOLOGY AND RESEARCH, Techno-Campus, Ghatikia, Bhubaneswar-751029, Odisha, India.**

The tax shall be shown extra by the Selected Bidder in their invoices for the items applicable. The same shall be paid by OUTF as per actual after verification. Similarly, if there is any tax savings, the same shall be reduced from the payable amount.



In case of any new incidence of tax or any change in existing tax rates taking place during the Agreement Period, that shall be borne and payable by OUTR over and above the agreed price for each item as may be applicable as per the Invoice raised by either Party/Member of the on OUTR. Similarly, any reduction in taxes shall be to the benefit of OUTR. All invoices produced to OUTR for payment should be with the TAX invoice.

**CAPEX** may include the cost of non-IT, IT equipment, and the active and passive components required for the project. **OPEX** may include operational expenditures such as Manpower costs, Operational Expenses, Other Expenses and Annual Maintenance Costs including comprehensive AMC of all the equipment for 05 (Five) years (Year 1+ Year 2+ Year 3+ Year 4+ Year 5), etc. to be incurred by the bidder for operation and maintenance of Project for 5 years after Go- Live.

#### **(d) Possible Outcomes**

With the successful management of CoE for 5 years following outcomes shall be expected

- To educate & train at least 200 students annually in World Skills recognized courses.
- Connect the certified students with industries for internships & placement opportunities
- Help in Job assistance needs to be provided to all the qualified/meritorious students registered.
- 2%-3% of enrolled startups will get formed out of the total enrolled startups
- 5%-10% of companies/MSMEs will benefit by collaborating with CoE.
- CoE shall facilitate all requirements for conducting research & development projects.
- Create revenue opportunities for the CoE through the following activities;
  - i) Conducting Joint Research
  - ii) Product Development
  - iii) Providing Consulting Services
  - iv) Conducting Training & Workshops
  - v) Providing Lab Services to startups, MSMEs & Researchers

#### **(e) Bill of Material (Technical Specification and Quantity)**

##### **ANSYS Academic Multi physics Campus Solution with 3 years AMC and Perpetual Lincence**

- I. **ANSYS Academic Research Mechanical & CFD Bundle -10 Task**
- II. **ANSYS Academic Research HF Bundle -10 task**
- III. **ANSYS Academic Research EM Bundle -10 task**
- IV. **ANSYS Academic Teaching Mechanical & CFD Bundle -50 Task**
- V. **ANSYS Academic Teaching HF Bundle -50 task**
- VI. **ANSYS Academic Teaching EM Bundle -50 task**
- VII. **Ansys Academic HPC upto 450 Cores**
- VIII. **LSTC University Department— 500 Core lease for 3 years**
- IX. **Ansys Academic Optislang - 10 Task**
- X. **Ansys GRANTA EduPack Introductory (10)**
- XI. **ANSYS Learning Hub 10 nos. license for 3-year lease**
- XII. **Ansys Innovation Course badges – 100 Badges**
- XIII. **Orientation training for Multiphysics campus**
- XIV. **Access to Anys Innovation Courses**
  - i) **SOFTWARE SOLUTIONS UNDER THE COE) AS PER TECHNICAL SPECIFICATIONS DOCUMENT (Qty.- 1 Set)**
  - ii) **TRAINER COST AS PER TECHNICAL BID DOCUMENT**
  - iii) **LEARNING CONTENT & LEARNING PLATFORM COST**

## **Model of Engagement (under COE: Ansys Authorised Exclusive partner will implement :**

- Signing of MOU (Memorandum of understanding) with OTR Management and CADFEM Management for Smooth Implementation.
- Dedicated Technical resources assigned for online support.
- Advanced Ansys Courses & Certification.
- Faculty Development Program.
- Train the Trainer Program.
- Online Technical Support to Students & Research Scholars.
- **Online Students Project Support (Minor/Major Project).**
- **Onsite Manpower support (1 person) for Smooth running of COE**
- **Online Project based training program for students.**
- **Ansys Cadfem Certification for nominated faculty members - 5 Nos**
- Support for Symposium and Technical Events.
- Incubation/Startup Program Support-
  - a. Highly Discounted ANSYS products for Start-ups
  - b. Mentoring the selected start-up on product design/Simulation
- **Webinar/Online training/Expert talks of Industry/Academia Expert from India/Abroad**
- Collaborative Joint Research publications in National/International forums
- Access to Online Students Community.
- Access to Ansys innovation courses-Unlimited.

**Scope of Work for supply of ANSYS Simulation Software Package (Teaching & Research License)**  
**(Ansys Mechanical & CFD, Ansys EM, Ansys HF, Ansys HPC, Ansys LSDYna, Ansys Optislang, Ansys Granta, Ansys ALH, Ansys Innovation Courses,).**

1. The firm shall supply ANSYS Academic Research Mechanical & CFD Bundle ,ANSYS Academic Research HF Bundle, ANSYS Academic Research EM Bundle, ANSYS Academic Teaching Mechanical & CFD Bundle, ANSYS Academic Teaching HF Bundle, ANSYS Academic Teaching EM Bundle, Ansys Academic HPC upto 450 Cores, LSTC University Department— 500 Core lease for 3 years, Ansys Academic Optislang, Ansys GRANTA EduPack Introductory, ANSYS Learning Hub, Ansys Innovation Course badges ,Orientation training for Multiphysics campus ,Access to Anys Innovation Courses Ansys Mechanical CFD, as per Bill of Materials and specification enclosed herewith.
2. The firm shall supply the latest version for software at the time of delivery.
3. The firm shall carry out installation of all the Software on the workstation computers in OUTR.
4. The firm shall demonstrate satisfactory working of all the modules and features of ANSYS Software Package in the workstations.
5. The firm shall provide free upgradation of all the modules of software during 3 years warranty period
6. The firm shall provide necessary basic and advanced level training to OUTR Faculty on the software.
7. The firm shall provide authorisation letter to quote, sell, and maintenance support for ANSYS products, from ANSYS software Pvt. Ltd, along with the technical bid.

**Delivery Schedule**

- Ansys software Package: Supply and installation **within 03 months from the date of Supply Order.**

**Bill of Materials:**

Sr No	Product Description
1	<p><b>ANSYS Academic Multiphysics Campus Solution with 3 years AMC</b></p> <p>I. ANSYS Academic Research Mechanical &amp; CFD Bundle -10 Task            II. ANSYS Academic Research HF Bundle -10 task            III. ANSYS Academic Research EM Bundle -10 task            IV. ANSYS Academic Teaching Mechanical &amp; CFD Bundle -50 Task            V. ANSYS Academic Teaching HF Bundle -50 task            VI. ANSYS Academic Teaching EM Bundle -50 task            VII. Ansys Academic HPC upto 450 Cores            VIII. LSTC University Department— 500 Core lease for 3 years            IX. Ansys Academic Optislang - 10 Task            X. Ansys GRANTA EduPack Introductory (10)            XI. ANSYS Learning Hub 10 nos. license for 3-year lease            XII. Ansys Innovation Course badges – 100 Badges            XIII. Orientation training for Multiphysics campus            XIV. Access to Ansys Innovation Courses</p>
2	Installation, commissioning, and Offline/Online Advance training for 10 days
3	Offline Troubleshooting/Loading, reloading of the software (twice in year) for the period of TECS
4	Onsite Trainer (at least One) Cost for COE

**SCOPE OF SUPPLY**

All the licenses should be of floating network license. The Vendor should provide at least three years warranty for the above products from the date of delivery.

-Technical Enhancements, Upgrades and updates should be provided free of cost by ANSYS during the warranty period. Customer support should be provided by ANSYS/ Authorized agency. ANSYS Customer portal log in access is to be provided by ANSYS for the following benefits:

-Online training courses, tutorials & training materials, Webinars. ---Download facility for current release, full products, updates, license manager, tools, documentation, Preview release, previous releases. Installation & licensing help and tutorials. In case TBRL is required to move the license to new server during AMC, ANSYS should support the same.

## 1. Technical Specification – Academic Research Computational Fluid Dynamic and Mechanical Bundle

### 1.1 Technical Specs for Computational Fluid Dynamic

Sl. No	Specification	Compliance Statement (Yes / No)
1	Supply, Installation and Commissioning of software for Computational Fluid Dynamics (CFD) with perpetual floating license.	
2	The software shall be licensed, well proven and established in the market. Software shall be compatible with Microsoft Windows 11. Software should have multicore processing capability during supply and shall have option to choose number of cores for solver	
3	The Software shall be capable of advanced design operations like polyhedral meshing, mosaic enabled Poly-Hexcore meshing, acoustics, heat transfer, standard turbulence models like spalart-allmaras, k-epsilon and advanced models like generalized k-omega model and high-fidelity models like scale-adaptive, detached eddy & large eddy simulations, battery modelling, Fluid-Structure Interaction, Combustion, Single and Multiphase Flows, Shape Optimization, Acoustics, Electric motor cooling.	
4	The software shall be capable of importing files in the following formats and perform above tasks CATIA (.CAT Part), Solidworks (.sldprt), Creo/ProE (.prt& .asm), NX (.prt), NEUTRAL (.step,.stp .stl, .iges, .igs).	
5	The software shall be capable of exporting results files in the following formats after performing above tasks. CGNS, CDAT, ASCII and Common Fluids Formats	
6	The software shall have the capability to provide solutions in all flow regimes, i.e, subsonic, sonic, supersonic, and hypersonic.	
7	Software shall have the following features for different fluid & solid materials with the appropriate properties: Should allow the user to define density, Specific heat, thermal conductivity & viscosity (only for fluids). Apart from the above, the software shall have a default database of extensive material library	
8	Graphic User Interface of the software shall have the following features. <ul style="list-style-type: none"> <li>a. A common GUI to support and carry out all the operations required for pre-processing, solver submission &amp; post-processing.</li> <li>b. The process setup specific to external aerodynamic analyses should be user-friendly.</li> <li>c. Easy creation of monitor plots for lift &amp; drag coefficients.</li> <li>d. GUI should be user friendly and interactive with import &amp; export features required for pre &amp; post processing.</li> <li>e. Highly automated process with easy setup change and result creation</li> </ul>	
9	Software should allow user to edit the imported geometry, as well as to create new geometry along with following geometry editing tools, Drag and split, Push/pull, Revolve/ Sweep, Detect & Repair improper geometry, Automatically create an enclosure and Boolean operation for external analyses, Volume extraction for internal flow analyses	
10	Post-processing capabilities shall include Contours, Vector plots, Creation of custom surfaces/points, XY plots, Transient/unsteady statistics, Streamlines ,Animations	
11	The software must be capable of receiving geometry input from a structural solver and output parameters from the aerodynamic analyses in a format compatible with an associated structural solver in a user-friendly manner.	

12	Must have the capability to import data from other physics solver to import the temperature, surface heat flux etc to perform Multiphysics analyses using Computational Fluid Dynamics and output .csv or .dat files for post-processing.	
13	<p>Fluent Solver Capabilities should include 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 &amp; 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</p> <ul style="list-style-type: none"> <li>• Regime change between particle and free surface (VOF &lt;-&gt; DPM)</li> <li>• Multiphase flow modeling</li> <li>• Complex Multiphase Regime Transitions</li> <li>• Surface Tension</li> <li>• Gas – Liquid – Solid Phase Change models, including Cavitation,</li> <li>• Boiling, Evaporation, Condensation, Solidification and Melting</li> <li>• Reactions Between Fluid Phases</li> <li>• Non-reacting Multicomponent Flow/Species Transport</li> <li>• Reacting Multicomponent Flow/Species Transport</li> <li>• Extensive Combustion modeling including FGM</li> <li>• Finite Rate Chemistry modeling</li> <li>• Pollutants and Soot Modeling</li> <li>• Ability to use Model Fuel Library Reaction Mechanisms</li> <li>• Comprehensive Surface-Kinetics</li> <li>• Flamelet Table Generation</li> <li>• Virtual cooling hole models (effusion and blade film cooling)</li> <li>• Electrochemistry modeling for Li-ion Batteries</li> <li>• Battery swelling modeling</li> <li>• Battery life modeling</li> <li>• Fuel Cell modeling</li> <li>• Multiple Stationary &amp; Rotating Reference Frames</li> <li>• Periodic Interfaces</li> <li>• Mixing Plane/Stage Frame Change Interface</li> <li>• Sliding-Mesh/Transient Rotor-Stator Frame Change Interface</li> <li>• Pitch Change across Frame Change Interfaces</li> <li>• Aerodynamic damping (Blade Flutter)</li> <li>• Dedicated Aerodynamics workspace (Fluent Aero)</li> <li>• In-flight Aircraft Icing modeling</li> <li>• Adjoint Solver for Shape Optimization</li> <li>• Parameter-driven mesh morphing and optimization</li> <li>• Parameters</li> <li>• Design Point Studies</li> <li>• Design of Experiments</li> </ul>	

	<ul style="list-style-type: none"> <li>• Local Parallel Solving</li> <li>• Distributed Parallel Solving</li> <li>• Batch solving</li> <li>• Parallel Solving on Cloud launched from Desktop</li> <li>• Workbench Integration</li> <li>• Simulation Reports</li> <li>• Functional Mockup Unit (FMU) Coupling</li> <li>• Fluid Structure Interaction (FSI) with Ansys Mechanical</li> <li>• Fluid Thermal Deformation with Ansys Mechanical</li> <li>• Built-in FEA solver for Fluid-Structural and Fluid-Thermal Stress Coupling</li> <li>• Fluid Electro-Thermal Interaction</li> <li>• Electromechanical Thermal Management</li> <li>• Aero-optics</li> <li>• Aero Acoustics and Vibro Acoustics</li> <li>• Acoustic-Structural</li> <li>• Fluid Magneto hydro dynamics (MHD)</li> </ul>	
14	<b>Fluent Meshing Capabilities should include</b> Polyhedral, oly-Mosaic-Enabled Meshing Technology, Hexcore, Hexcore, Tet and Prism meshing, Task-Based Workflow - Watertight Geometries, Task-Based Workflow - Fault Tolerant Geometries, Parallel Mesh Generation, Wrap meshing, Rapid Octree meshing	
15	<b>CFX Solver Capabilities should be included</b>	
16	<b>Turbogrid Meshing Capabilities should be included</b>	
17	<b>Polyflow Solver Capabilities should be included</b>	
18	<b>Forte Solver Capabilities should be included</b>	
19	<b>Chemkin-Pro Solver Capabilities should be included</b>	
20	<b>Fensap-Ice Solver Capabilities should be included</b>	
21	<b>Post-Processing Capabilities should be included</b>	
22	<b>Optislang</b> <ul style="list-style-type: none"> <li>• Scalar Variations for Parametric Design Study</li> <li>• Integrations <ul style="list-style-type: none"> <li>○ Integration with Ansys Workbench</li> <li>○ Integration with Ansys Materials Product Family</li> <li>○ Two-Way Integration with ModelCenter</li> <li>○ Integration with LS-OPT</li> </ul> </li> <li>• Support of HPC Solver Licenses</li> <li>• Orchestration and Automation <ul style="list-style-type: none"> <li>○ Build and Automate Workflows</li> <li>○ Integrate 3rd Party Tools</li> <li>○ App Generation Wizard</li> <li>○ Test-Run and Desktop App</li> <li>○ Classic Design of Experiments</li> <li>○ Sampling and Sensitivity Analysis</li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>○ Robust Design Optimization</li> <li>● Product Improvement <ul style="list-style-type: none"> <li>○ Scalar Meta-Modeling (including test data)</li> <li>○ Signal/Field Meta-Modeling (including sensor &amp; 3D scan data)</li> <li>○ Modeling of Imperfect Surfaces for UQ</li> <li>○ AI for Metamodeling (including algorithms from Probaligence)</li> <li>○ Optimization &amp; Sensitivity Analysis</li> <li>○ Model Calibration</li> <li>○ Concurrent Design Point Variations</li> <li>○ Linux Support for DesignXplorer Algorithms</li> </ul> </li> <li>● Product Robustness <ul style="list-style-type: none"> <li>○ Robust Design &amp; Reliability Analysis</li> <li>○ Reliability Importance</li> </ul> </li> </ul> <p>Poisson Distribution for Stochastic Parameters</p>	
23	<p><b>Material Data Management</b></p> <ul style="list-style-type: none"> <li>● Multiple Unit System Support</li> <li>● Browse Materials Data</li> <li>● Edit and Update Materials Data</li> <li>● Search and Query Materials Data</li> <li>● Represent Property Data in Interactive Charts</li> <li>● Comparison Tables and Comparison Charts</li> <li>● Export Data to Excel and Third-Party Software</li> </ul>	
24	<p><b>Additional Capabilities</b></p> <ul style="list-style-type: none"> <li>● Discovery Modeling, SpaceClaim modeling</li> <li>● Ansys Meshing (Workbench Meshing),</li> <li>● ICEM CFD meshing.</li> <li>● DesignXplorer</li> </ul>	

Ease of Use and Productivity

- 1 ● Dedicated common platform for uniform, easy to use, efficient, seamless between solvers/analysis/physics.
- Integrated and comprehensive Multiphysics.
- Reduced simulation and product development time & cost.
- ACT makes process faster and flexible.

User Interface

- 2 ● New CFD Solver gives single window experience with task based meshing workflow that guides users through the simulation process, reducing the options to only those that are relevant at each point in the process, and providing best practices as defaults.
- Watertight geometry workflow (usable by about 60% of customers) is faster: reduces 8 panels to 0, 70% fewer clicks, -50% hands-on time.
- Fault Tolerant workflow (or the other 40% of customers) to handle non-watertight, dirty geometry.

Geometry Strong CAD Interface

- 3 ● CAD tool is incomparable as performance, productivity & usability.
- Bi-directional CAD connection between our tool and other third-party CAD.
- Tool is totally CAD neutral

Meshing

- 4 ● Mosaic meshing techniques automatically combines any type of boundary layer meshes with high quality polyhedral meshes for fast and accurate flow resolution.
- 10x faster meshing with task-based workflows and parallel meshing.
- Meshing tool produces high quality meshes that solve 2x faster.



- For IC engines, solver provides automatic mesh generation including solution adaptive mesh refinement and geometry-based adaptive mesh refinement that eliminate weeks of manual effort.

**Solver**

- CFD solver is recognized for its gold standard accuracy and with best and broader modelling: turbulence (e.g. GEKO model), multiphase, combustion, aerodynamics, etc.
- 5 • Dedicated turbomachinery solver is recognized for its gold standard accuracy and market leadership in turbomachinery applications.
- Solvers rapidly predict IC engine ignition and emissions, combining multicomponent fuel models with comprehensive spray dynamics thanks to the incorporated with our chemistry solver.

**Post-Processing**

- 6 • Dedicated tool for post processing for all CFD, and Multiphysics simulations
- CFD solver itself have a expression technique to increase the customization of the post processing according the requirements

**Optimization**

- Parametric solution with DoE Technique offers better integration/flexibility.
- 7 • Unique parametrization solver with automated morphing workflow integrated with in the CFD solver.
- Excellent vertical workflow solution with turbomachinery solver.

**Multiphysics & Systems**

- 8 • Common Platform helps to for easy coupling between the different physics solvers.
- Strong interconnectivities between different Physics solvers such as: CFD, Electromagnetics & partner Solvers for solving the complex Multiphysics Problems.

**Cloud**

- 9 • Cloud facility is available for all CFD Solvers
- Pre and post in the cloud with in-browser experience

**Design Sensitivity and Optimization**

- FE solver allows hundreds of different configurations with minimum effort.
- Able to optimize parameters from different physics

**Licensing**

- 10 • CFD teaching/Research/Associate leases and perpetuals for regular use based on the usage policy.
- Elastic Licensing for peak/burst
- Multiyear pricing options

**1.2. Technical Specifications for Finite Element Analysis Software**

Sl.No	Specification	Compliance Statement (Yes/No)
1	Supply, Installation and Commissioning of software for Computational Mechanics along perpetual floating license.	
2	The software shall be licensed, well proven and established in the market. Software shall be compatible with Microsoft Windows 11. Software should have multicore processing capability during supply and shall have option to choose number of cores for solver	
3	The Software shall be capable of Interacting with other physics solvers for Multiphysics analysis	

4	<p>The Software shall be capable of solving different types of analysis as following</p> <ol style="list-style-type: none"> <li>a. Full 2D and 3D Capabilities</li> <li>b. Static Structural- linear &amp; nonlinear</li> <li>c. Linear dynamics – Modal, Harmonic, Random Vibration &amp; Response spectrum</li> <li>d. Nonlinear Dynamics- Implicit and Explicit</li> <li>e. Thermal – Steady state and transient</li> <li>f. Fatigue</li> <li>g. Modeling of Composite Materials</li> <li>h. Topology Optimization</li> <li>i. Wave Hydrodynamics</li> </ol>	
5	<p>The software shall be capable of importing files in the following formats and perform above tasks CATIA (.CAT Part), Solidworks (.sldprt), Creo/ProE (.prt&amp; .asm), NX (.prt), NEUTRAL (.step, .stp .stl, .iges, .igs&amp; .dxf).</p>	
6	<p>Software should allow user to edit the imported geometry, as well as to create new geometry along with following geometry editing tools:</p> <ol style="list-style-type: none"> <li>a. Drag and split</li> <li>b. Push/pull</li> <li>c. Revolve/ Sweep/pattern</li> <li>d. Detect &amp; Repair improper geometry</li> <li>e. Mid surface extraction for shell meshing</li> </ol>	
7	<p>Software shall have the following features for different materials models with the appropriate properties:</p> <ol style="list-style-type: none"> <li>a. Software should have material library of most used materials with wide range of temperature dependent material flow properties</li> <li>b. Material data should be editable (ASCII format)</li> <li>c. Isotropic model, Plasticity model – Multi linear and bilinear – kinematic and isotropic Hardening, Composites, Cohesive Material Models, Hyper-elastic, fatigue, temperature dependent material models, User-Defined Materials, etc.</li> </ol>	
8	<p>The software shall be capable of generation 2D, and 3D mesh. Capable of automatic mesh generation. Should have provision for generating the mesh for simple to complex geometry using the following meshing algorithms</p> <ol style="list-style-type: none"> <li>a. Sweep, Multizone, Patch confirming and Hex dominant with the quality control for different Physics. Global and local setting are to be present to control the mesh settings.</li> <li>b. Tetrahedral, Hex, Prism elements should be generated</li> </ol> <p>Adaptive Meshing Algorithm based on Mesh, Energy, contact criteria must be present</p>	
9	<p>Software shall have the features to automatically /manual generate contacts. Following contacts are to be present</p> <ol style="list-style-type: none"> <li>a. Bonded, Frictional, Frictionless, Rough and No separation.</li> </ol> <p>Following contact algorithms are to be present MPC, Normal Lagrange, Augmented Lagrange, Pure Penalty and Beam connection.</p>	
10	<p>Software should be capable of different kinds of boundary conditions as follows</p> <ol style="list-style-type: none"> <li>a. Imported loads from other physics solvers like CFD, Optics etc.</li> <li>b. Bolt Pretensions</li> <li>c. Force, moment, and displacement-based boundary conditions</li> </ol>	
11	<p>Graphic User Interface of the software shall have the following features</p> <ol style="list-style-type: none"> <li>a. A common GUI to support and carry out all the operations required for pre-processing, solver submission &amp; post-processing</li> <li>b. The process setup specific to Multiphysics analysis</li> <li>c. GUI should be user friendly and interactive with modular and import &amp; export features required for pre &amp; post processing.</li> </ol>	

	<p>d. Capability to assign material property, loads and boundary conditions directly to geometry Highly automated process with easy setup change and result creation</p>	
12	<p><b>Vibrations</b></p> <ul style="list-style-type: none"> <li>• Modal, modal – Pre-Stressed,/damped/Unsymmetric</li> <li>• Transient – Mode-Superposition</li> <li>• Harmonic – Mode-Superposition, Full</li> <li>• Spectrum, Random Vibration</li> <li>• Mistuning, Multi-Stage Cyclic Symmetry, Rotor dynamics</li> </ul>	
13	<p><b>Acoustics:</b></p> <ul style="list-style-type: none"> <li>• Modal, Modal – Pre-Stressed</li> <li>• Modal – Damped/Unsymmetric</li> <li>• Transient – Mode-Superposition,</li> <li>• Harmonic – Mode-Superposition, Harmonic – Full</li> <li>• Spectrum, Random Vibration</li> <li>• Mistuning, Multi-Stage Cyclic Symmetry, Rotor dynamics</li> </ul>	
14	<p><b>Wave Hydrodynamic:</b></p> <ul style="list-style-type: none"> <li>• Diffraction and Radiation</li> <li>• Frequency &amp; Time Domain Motions Analysis</li> <li>• Moorings, Joints &amp; Tethers</li> <li>• Internal Tanks</li> <li>• Load Transfer to Structural Analysis</li> </ul>	
15	<p><b>Composite Materials</b></p> <ul style="list-style-type: none"> <li>• Material Definitions, Ply Definitions, Interface Layers</li> <li>• Advanced Ply-Modeling Features, Variable Material Data</li> <li>• Solid Extrusion, Lay-Up Mapping, Draping, Lay-Up Exchange Interfaces</li> <li>• Advanced Failure Criteria Library, First-Ply Failure, Last-Ply failure</li> <li>• Delamination, Composite Cure Simulation, Sandwich Modeling</li> <li>• Automation / Run Scripts, Short Fiber Composites</li> </ul>	
16	<p><b>Durability</b></p> <ul style="list-style-type: none"> <li>• Stress-Life (SN),Strain-Life (EN),Dang Van</li> <li>• Safety Factor, Adhesive Bond, Crack Growth Linear Fracture Mechanics</li> <li>• Seam Weld, Spot Weld,</li> <li>• Thermo-Mechanical Fatigue, Vibration Fatigue, Short-Fiber Composite Fatigue</li> <li>• Virtual Strain Gauge Correlation, Python Scripting Customization</li> </ul>	
17	<p><b>Explicit Dynamics</b></p> <ul style="list-style-type: none"> <li>• FE (Lagrange) Solver, Euler Solvers</li> <li>• Implicit-Explicit Material States, Mass Scaling</li> <li>• Natural Fragmentation, Erosion Based on Multiple Criteria</li> <li>• De-Zoning, Part Activation and Deactivation (Multi Stage Analysis)</li> <li>• Explicit Time Integration</li> </ul>	
18	<p><b>Geometric Idealization</b></p> <ul style="list-style-type: none"> <li>• Spring, Mass, Damper, Spar, Beam, Cable, Pipe/Elbow,Shell – Thin</li> <li>• Layered Shell -Thin (Composite),Shell – Thick (Solid Shell)</li> <li>• Layered Shell – Thick (Solid Shell) (Composite)</li> <li>• 2D Plane / Axisymmetric,3D Solids, Layered 3D Solids (Composite)</li> <li>• Infinite Domain,2.5D Elements, Reinforcement Elements</li> </ul>	

	<ul style="list-style-type: none"> <li>• Coupled Field ROM Element Technology,</li> <li>• Iso-Geometric Analysis (IGA)</li> </ul>	
19	<p><b>Materials</b></p> <ul style="list-style-type: none"> <li>• Basic Linear Materials (Linear, Anisotropic, Temperature Dependent)</li> <li>• Basic Nonlinear Materials (Hyperelastic, Plasticity, Rate Independent, Isotropic, Concrete, Viscoelasticity)</li> <li>• Advanced Nonlinear Materials (Rate dependent, Anisotropic, Damage Models, Geomaterials, Multiphysics, Acoustics)</li> <li>• Specialty Materials (Glass, Foam, Kevlar, Fabric, Biomechanic, Paper, Cardboard)</li> <li>• Field Dependent, Reactive Materials (Equations of State, High Explosives, Propellants), User Defined Materials</li> <li>• Fracture Mechanics and Crack Growth, Materials Multiscale Homogenization</li> <li>• Materials Database</li> </ul>	
20	<p><b>Modelling Capabilities:</b></p> <ul style="list-style-type: none"> <li>• Contact – Linear, Contact – Nonlinear, Joints, Seam Welds, Spot Welds</li> <li>• Element Birth and Death, Gasket Elements</li> <li>• Rezoning and Adaptive Remeshing, Inverse Analysis</li> </ul>	
21	<p><b>Multi Analysis</b></p> <ul style="list-style-type: none"> <li>• Submodeling, Data Mapping, Multiphysics Data Mapping</li> <li>• Initial State, Advanced Multi-Stage 2-D to 3-D Analysis</li> </ul>	
22	<p><b>Nonlinear and Multibody Dynamics</b></p> <ul style="list-style-type: none"> <li>• Rigid Body Mechanisms</li> <li>• Rigid Body Dynamics with CMS Components for Flexible Bodies</li> <li>• Full Transient, CMS with Substructuring</li> <li>• Mixed Rigid – Flexible Systems, Function Expression</li> <li>• Drivetrain Creation, Links, Vehicle Dynamics</li> </ul>	
23	<p><b>Optimization:</b></p> <ul style="list-style-type: none"> <li>• Design Xplorer included, Parameters</li> <li>• Design Point Studies, Correlation Analysis</li> <li>• Design of Experiments, Sensitivity Analysis</li> <li>• Goal Drive Optimization</li> </ul>	
24	<p><b>Structural Solver Capabilities:</b></p> <ul style="list-style-type: none"> <li>• Linear Static, Nonlinear Static, Pre-Stress Effect, Linear Perturbation</li> <li>• Nonlinear Geometry, Buckling – Linear Eigenvalue</li> <li>• Buckling – Nonlinear Post Buckling Behavior</li> <li>• Buckling – Nonlinear Post Buckling Behavior – Arc Length</li> <li>• Steady State Analysis Applied to a Transient Condition</li> <li>• Advanced Wave Loading</li> </ul>	
25	<p><b>Thermal:</b></p> <ul style="list-style-type: none"> <li>• Steady State Thermal, Transient Thermal, Conduction</li> <li>• Convection, Radiation to Space, Radiation – Surface to Surface</li> <li>• Phase Change, Thermal Analysis of Layered Shells and Solids</li> </ul>	
26	<p><b>Topology and Lattice Optimization:</b></p> <ul style="list-style-type: none"> <li>• Structural Optimization, Modal Optimization</li> <li>• Thermal Loads, Inertial Loads</li> <li>• Optimized Design Validation, Manufacturing Constraints</li> <li>• Stress Constraints, Symmetry, Lattice Optimization</li> <li>• Overhang/Additive Constraints</li> </ul>	

27	<p><b>Metal Stamping:</b></p> <ul style="list-style-type: none"> <li>• Multi-Stage Forming Process Validation</li> <li>• Material Data Library and Management, Process Definition</li> <li>• Tool Setup and Preview, Drawbead Definition</li> <li>• Multiple Lancing Operation</li> <li>• Stamping Specific Post Processing (FLD, Formability Index, Wrinkling, Skidmark), Clamping Simulation</li> </ul>	
30	<p><b>Additive Prep:</b></p> <ul style="list-style-type: none"> <li>• Define Build Envelope, Multiple Parts</li> <li>• Optimize Part Orientation Based upon Distortion Tendency, Build Time and Supports</li> <li>• Support Region Detection and Manual Modification</li> <li>• Created Multiple Support Types in One Region</li> <li>• Control of Support Parameters, Multiple Support Types</li> <li>• Angled Supports, Perforations, Tooth Patterns, Intrusion, Sizing and Distribution of Support Walls, Automatic Support Generation</li> <li>• Export of STL and Space Claim Files</li> <li>• Export of Additive Manufacturing Equipment (OEM) Build Files</li> <li>• Cost Estimation, Layer/Scan Vector Visualization</li> </ul>	
31	<p><b>Workbench Additive:</b></p> <ul style="list-style-type: none"> <li>• Nonlinear and Temperature Dependent Material Properties</li> <li>• Thermo-Mechanical Coupled Strain Solution, Native Mechanical Environment</li> <li>• Part Distortion and Residual Stress after Baseplate Cut-Off and/or Support Removal, Directional Part and Support Removal</li> <li>• Recoater Interference Detection, Identification of High Strain (Crack) Locations</li> <li>• Layer by Layer Stress and Distortion Visualizations</li> <li>• Option to Output Only the Last Layer of the Build or Every Nth Layer</li> <li>• Distortion Compensation, User-Defined Step Option as 1st or Last Sequence Step</li> <li>• Layered Tetrahedral Meshing, Post Build Heat Treatment</li> <li>• Import of STL Supports, Inherent Strain Isotropic and Anisotropic</li> <li>• Strain Scaling Factor for Thermal and Structural Analyses</li> <li>• STL Files can be Exported from STL Supports, Voxel Mesh Generation</li> <li>• Wizards to Transfer Results from Additive Print to Workbench Additive</li> <li>• Calibration setup in AM Wizard, AM Bond Implementation</li> <li>• Layer End Temperature Output, Process Simulation for Directed Energy Deposition</li> <li>• Direct Energy Deposition – Wizard, Direct Energy Deposition – G-Code Clustering, Direct Energy Deposition – Manual Clustering</li> <li>• Automatic Distortion Compensation Optimization, Scan Pattern Based Anisotropic Strain, Machine Learning Thermal Strain</li> <li>• “Binder Jet Sintering, Sintering Material Model, Sintering Material Model – Wizard</li> </ul>	
32	<p><b>Additive Print</b></p> <ul style="list-style-type: none"> <li>• Nonlinear and Temperature Dependent Material Properties</li> <li>• Uniform Assumed Isotropic Strain</li> <li>• Scan Pattern Based Anisotropic Strain</li> <li>• Thermal Ratcheting Based Anisotropic Strain</li> </ul>	
33	<p><b>Miscellaneous and Usability:</b></p> <ul style="list-style-type: none"> <li>• Ansys Space Claim, Ansys Customization Suite (ACS),Support ACT Extensions</li> <li>• Journaling and Scripting, Command Snippet Support</li> <li>• Batch run capability, Read/Write 3rd Party Matrix CAE Data</li> </ul>	

	<ul style="list-style-type: none"> <li>• CDB and 3rd party FE Model Import, Nastran Bulk File Export</li> <li>• Direct Input of Nastran Bulk Data Files, Pre-stressing from Nastran Linear Solution, Global/Selective Mass Scaling</li> <li>• Keyword Input, Splitting of Input File into Subfiles</li> <li>• Transmitting boundaries, Dynamic Storage Allocation</li> <li>• Extensive Output Data Controls (ascii/binary), Sense Switch Controls – Monitor Simulations Status, Interactive Real-Time Graphics, Double Precision</li> </ul>	
34	<p><b>Optislang</b></p> <ul style="list-style-type: none"> <li>• Scalar Variations for Parametric Design Study</li> <li>• Integrations <ul style="list-style-type: none"> <li>○ Integration with Ansys Workbench</li> <li>○ Integration with Ansys Materials Product Family</li> <li>○ Two-Way Integration with Model Center</li> <li>○ Integration with LS-OPT</li> </ul> </li> <li>• Support of HPC Solver Licenses</li> <li>• Orchestration and Automation <ul style="list-style-type: none"> <li>○ Build and Automate Workflows</li> <li>○ Integrate 3<sup>rd</sup> Party Tools</li> <li>○ App Generation Wizard</li> <li>○ Test-Run and Desktop App</li> <li>○ Classic Design of Experiments</li> <li>○ Sampling and Sensitivity Analysis</li> <li>○ Robust Design Optimization</li> </ul> </li> <li>• Product Improvement <ul style="list-style-type: none"> <li>○ Scalar Meta-Modeling (including test data)</li> <li>○ Signal/Field Meta-Modeling (including sensor &amp; 3D scan data)</li> <li>○ Modeling of Imperfect Surfaces for UQ</li> <li>○ AI for Metamodeling (including algorithms from Probaligence)</li> <li>○ Optimization &amp; Sensitivity Analysis, Model Calibration</li> <li>○ Concurrent Design Point Variations</li> <li>○ Linux Support for DesignXplorer Algorithms</li> </ul> </li> <li>• Product Robustness <ul style="list-style-type: none"> <li>○ Robust Design &amp; Reliability Analysis, Reliability Importance</li> </ul> </li> </ul> <p>Poisson Distribution for Stochastic Parameters</p>	
35	<p>Software should have generalized post-processing ability such as visualization of relevant results by contour plotting, animation, and creation of various kind of plots used in analysis. Post-processing capabilities shall include</p> <ol style="list-style-type: none"> <li>a. Deformation, Temperature, stresses, and strain contour plots</li> <li>b. Results can be mapped on node, elements, vertex, edge, surface, and volume</li> <li>c. Results on path or surface</li> <li>d. Capped Iso-surfaces plot</li> <li>e. Acceleration, velocity plots</li> <li>f. Safety factor and life</li> <li>g. Export the Deformed geometry as STL file</li> <li>h. Plotting utilities like multi-page/multi-plot for post processing</li> </ol>	
36	<p>Software should have High performance capabilities</p> <ul style="list-style-type: none"> <li>• Built-in HPC – 4cores per task</li> <li>• Additional HPC – 12 cores (floating) per task</li> <li>• Ansys LS Dyna HPC – 15 cores (floating) per task</li> <li>• Ability to extend build-in HPC (at extra cost)</li> </ul>	

37	<p><b>Software Should include Discrete Element Modeling (DEM) capabilities as below :</b></p> <p><b>General Features</b></p> <ul style="list-style-type: none"> <li>• Modify Material Compositions, Modify Materials Interactions</li> <li>• Extend Simulation ,Restart Capabilities</li> <li>• Resume Capabilities ,Solver Scheduler Tool</li> <li>• Periodic Domains (Cartesian or Cylindrical)</li> <li>• (API) Python Macro &amp; Scripting (Pre &amp; Post) ,Parametric Support (Pre &amp; Post)</li> <li>• Unit System Management ,Project Archive &amp; Restore</li> <li>• Windows OS Support ,Linux OS Support</li> <li>• Command Line &amp; Headless System Support ,Light and Dark Themes</li> </ul> <p><b>Contact and Physical Models</b></p> <ul style="list-style-type: none"> <li>• Rolling Resistance Model: Type A: Constant Moment (Type 1)</li> <li>• Rolling Resistance Model: Type C: Linear Spring Rolling Limit (Type 3)</li> <li>• Contact Model (Normal Forces): Hysteretic Linear Spring, Linear Spring Dashpot, and Hertzian Spring Dashpot</li> <li>• Contact Model (Tangential Forces): Linear Spring Coulomb Limit, Coulomb Limit, and Mindlin-Deresiewicz</li> <li>• Contact Model (Adhesive Forces): Constant, Linear, and JKR</li> <li>• Shear Wear Contour Plots,Wear (Surface Modification)</li> <li>• Particle Breakage Models: Ab-T10 and Tavares</li> <li>• Joint Breakage Models: Griffith Energy Criterion, Shear Stress Criterion, Tensile Stress Criterion, Tensile or Shear,Stress Criterion, and von Mises Stress Criterion</li> <li>• Thermal Model ,Lattice Boltzmann Air Flow ,CFD Coupling: Constant One Way</li> <li>• Coarse Grain Models ,Joint Models: Linear Elastic and Bilinear Elastoplastic</li> </ul> <p><b>Geometry Types</b></p> <ul style="list-style-type: none"> <li>• Imported Geometries (import *.xgl, *.stl, and *.dxf Files)</li> <li>• Rocky Feed Conveyor Parametric ,Rocky Receiving Conveyor Parametric</li> <li>• Custom Inlets ,Imported Geometries from ANSYS Fluent (import *.cas and *.msh Files) ,Imported Geometries from Ansys Motion (import *.fmu and *.dfg Files)</li> <li>• Geometry Motions, Rotation Motion ,Translation Motion</li> <li>• Rotation Motion Without Displacement ,</li> <li>• Translation Motion Without Displacement</li> <li>• Periodic Translation (Vibration) Motion, Periodic Rotation (Pendulum) Motion</li> <li>• Additional Force/Moment Motion ,Spring-Dashpot Force/Moment Motion</li> <li>• Linear Time Variable Force/Moment Motion ,Cone Crusher Motion ,Periodic Motion ,6-DoF (Degrees of Freedom) Motion</li> <li>• Imported Motions from Ansys Fluent ,Replicate Geometry</li> <li>• Nested Motion Frames ,2-Way Coupling with Ansys Motion</li> </ul> <p><b>Particle Types</b></p> <ul style="list-style-type: none"> <li>• Rounded Particle Types including Sphere, Sphero-Cylinder, Sphero Polygon, and Sphero-Polyhedron</li> <li>• Non-Round Particle Types including Polyhedron, Briquette, and Faceted Cylinder</li> </ul>	
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	<ul style="list-style-type: none"> <li>• Custom Imported Convex Particles ,Custom Imported Concave Particles</li> <li>• Flexible Particle Type (Fiber, Shell, and Polyhedron)</li> <li>• Fiber Particle Type (Rigid, Flexible, Frozen, Joint Breakage, and/or CFD Coupled)</li> <li>• Shell Particle Type (Rigid, Flexible, Joint Breakage, and/or CFD Coupled)</li> <li>• Assembly Particle Type (Rigid, CFD Coupled, Heterogeneous Material)</li> <li>• Particle Size Distribution ,</li> <li>• Adhesive Materials (Wet/Dry/Sticky Contact Rheologies)</li> </ul> <p><b>Particle Input Types</b></p> <ul style="list-style-type: none"> <li>• Continuous Injection Particle Input</li> <li>• Volume Fill Particle Input ,Custom Particle Input</li> </ul> <p><b>Coupling Capabilities</b></p> <ul style="list-style-type: none"> <li>• Parametric Integration through Ansys Workbench</li> <li>• Mechanical Solver Coupling</li> <li>• 1-Way Static Coupling (DEM-to-FEA)</li> <li>• 1-Way Transient Coupling (DEM-to-FEA)</li> <li>• CFD Solver Coupling</li> <li>• Static 1- Way Coupling (CFD-to-DEM)</li> <li>• Transient 1-Way Coupling (CFD-to-DEM)</li> <li>• Single Phase 2-Way Coupling (CFD-DEM)</li> <li>• Multiphase 2-Way Coupling (CFD-DEM)</li> <li>• Multi-Species 2-Way Coupling (CFD-DEM)</li> <li>• 2-Way Fluent Semi-Resolved Coupling</li> </ul>	
38	<p><b>General Tools in the Bundle</b></p> <p>Ansys Geometry Interfaces for Parasolid &amp; SAT</p> <p>Ansys Geometry Interfaces for Solidwork, SolidEdge, Autodesk, NX</p> <p>Ansys Geometry Interface for CATIA V5 &amp; V6 Reader</p> <p>Ansys Geometry Interface for Creo Parametric &amp; Elements/Direct Modeling</p> <p>Geometry Interface for JT</p> <p>Built-in HPC (4 cores per task)</p> <p>Ansys HPC (Additional floating 12 cores per task)</p> <p>Ansys LS Dyna HPC (3 floating cores per each teaching task and 15 floating cores per each research task)</p> <p>Ansys Rocky HPC (Additional floating 12 cores per task)</p> <p>Ability to extend built-in HPC (at extra cost)</p> <p>Ansys optiSLang Enterprise</p> <p>Floating LAN Licenses (Country Wide standard)</p>	

## 2. Ansys Academic Research HF Bundle

Sr No	Description	Compliance
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1	<ul style="list-style-type: none"> <li>• <b>The package should have the capability to simulate any arbitrary 2D or 3D model for EM simulation from DC to THz frequency and can also extend the solution to Multiphysics Thermal Analysis. Circuit simulation tool should allow user to integrate multiple electromagnetically analyzed models to carry out a system-level analysis</b></li> </ul>	
2	<p><b>Software Suite and Licenses</b></p> <ul style="list-style-type: none"> <li>• Ansys Discovery Modeling</li> <li>• Ansys Discovery Simulation</li> <li>• Ansys Sherlock</li> <li>• Ansys Electronic Enterprise <ul style="list-style-type: none"> <li>❖ HFSS 3D</li> <li>❖ HFSS 3D Layot</li> <li>❖ Q3D Extractor</li> <li>❖ Q2D Extractor</li> <li>❖ Circuit</li> <li>❖ Circuit Netlist</li> <li>❖ EMIT</li> <li>❖ Icepak</li> <li>❖ Icepak Classic</li> <li>❖ Maxwell 3D</li> <li>❖ Maxwell 2D</li> <li>❖ Maxwell Circuit</li> <li>❖ Rxmprt</li> <li>❖ Simplorer</li> <li>❖ Mechanical</li> </ul> </li> <li>• Ansys EMC Plus</li> <li>• Ansys Charge Plus</li> <li>• Ansys MotorCAD Enterprise</li> <li>• Ansys NuHertz FilterSolutions</li> <li>• Ansys Medini Analyze Enterprise</li> <li>• ModelCenter Premium</li> <li>• Ansys MC MBSE Connectors (Windchill, Genesys, and Rhapsody)</li> <li>• Ansys Granta Materials Data for Simulation</li> <li>• Built-in HPC (4 cores per task)</li> <li>• Ansys HPC (Additional floating 12 cores per task*)</li> <li>• Ansys optiSLang Enterprise</li> </ul> <p>Floating LAN Licenses (50-mile radius standard, upgradeable to Country Wide)</p>	
3	<p><b>Numerical Solver Technology</b></p> <ul style="list-style-type: none"> <li>▪ <b>HFSS (High Frequency 3D Electromagnetic Field simulation)</b> <ul style="list-style-type: none"> <li>• 3D full-wave Frequency Domain-based electromagnetic field solver based on the Finite Element Method (FEM).</li> <li>• 3D full-wave Frequency Domain-based electromagnetic field solver based on Integral Equation Method (MoM).</li> <li>• 3D full-wave Time Domain-based electromagnetic field solver based on Discontinuous Galerkin (DG) and FEM Time Domain Methods.</li> <li>• 3D full-wave Frequency Domain-based Asymptotical electromagnetic field solver based on Shooting and Bouncing Ray + (SBR+) method.</li> <li>• 3D full-wave Frequency Domain, Eigen Mode Solver, based on FEM.</li> </ul> </li> </ul>	

- 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)
- **Maxwell (Low-frequency electromagnetic field simulation for 3D/2D structures)**
  - Transient - nonlinear analysis with:
    - Motion—rotation, translational, non-cylindrical rotation.
    - External circuit coupling.
    - Permanent magnet demagnetization analysis.
    - Core loss computation.
    - Lamination modelling for 3D.
  - AC Electromagnetic—Analysis of devices influenced by skin/proximity effects, eddy/displacement currents.
  - Magneto static—Nonlinear analysis with automated equivalent circuit model generation.
  - Electric Field—Transient, Electrostatic/Current flow analysis with automated equivalent circuit model generation.
  - 2D low-frequency electromagnetic solver should be able to
    - Extract Torque, Power, current variations.
    - Capability to do the demagnetization study, help to extract Torque Speed characteristics.
    - Inbuilt circuit solver to a model electronic circuit like inverters, rectifiers, etc and connect with 2D Electromagnetic model.
    - Extract losses as output for CFD (Thermal) Analysis.
- **Q3D (Quasi-static electromagnetic field simulation for 2D/3D RLGC extraction)**
  - 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.
- **AEDT ICEPAK (CFD - Thermal Analysis )**
  - 3D CFD solver for Transient and Static Thermal Analysis.
  - Capable to handle types of heat transfer: Conduction, Convection and radiation: Combination of all modes of heat transfer.
  - 3D Static Solver for Transient and Static Thermal Analysis.

- 3D FEA solver Mechanical Stress Analysis.
- **Siwave(2.5D Electromagnetic solver for PCB, Planar structures )**
  - 2.5D Hybrid (FEM + MOM) solver for PCB, Package.
  - EMI Scanner - Capable.
  - Able to model and simulate following SI and PI effects.
  - resonance frequencies of complete power and ground structures,
    - power and ground bounce,
    - simultaneous switching noise,
    - impedance discontinuities due to changes in signal layers or split supply planes,
    - noise coupling between signal lines and supply planes,
    - time-domain effects such as propagation delay, rise and fall times, reflections and ringing,
    - frequency-domain phenomena such as resonant modes and S, Y, and Z-parameters.
    - DC IR analysis to compute DC voltage drop and current density
  - Near and far field analysis, automatically from circuit simulation waveforms for accurate source modelling and thus accurate emissions analysis (EMI/EMC).
- **Circuit simulation (Designer, Simplorer and EMIT)**
  - ID circuit simulation capability for following RF simulations
    - Permanent magnet demagnetization analysis.
    - Core loss computation.
    - Lamination modelling for 3D.
  - AC Electromagnetic—Analysis of devices influenced by skin/proximity effects, eddy/displacement currents.
  - Magneto static—Nonlinear analysis with automated equivalent circuit model generation.
  - Electric Field—Transient, Electrostatic/Current flow analysis with automated equivalent circuit model generation.
  - 2D low-frequency electromagnetic solver should be able to
    - Extract Torque, Power, current variations.
    - Capability to do the demagnetization study, help to extract Torque Speed characteristics.
    - Inbuilt circuit solver to a model electronic circuit like inverters, rectifiers, etc and connect with 2D Electromagnetic model
    - Extract losses as output for CFD (Thermal) Analysis.
  - 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

	<ul style="list-style-type: none"> <li>○ Load pull analysis and model support</li> <li>○ Periodic transfer function analysis</li> <li>● Circuit System solver should have <ul style="list-style-type: none"> <li>○ Build power electronic circuits using IGBT, BJT, MOSFET, etc.</li> <li>○ Capability to characterize semiconductor switches from manufacturer datasheet.</li> <li>○ Capability to do time and frequency domain simulations.</li> <li>○ Capability to co-simulate with physics-based models.</li> <li>○ Capability to import Reduced-Order Models generated for Physics-based simulations.</li> </ul> </li> <li>● 1D Power Spectral Based solver for finding RF interference between different Microwave system.</li> <li>● System-level solver for Integrating physics-based model with multi-domain based components, Power Electronic circuits, etc.</li> <li>● Power Spectral solver should provide following RFI matrices across multiple Transmitter and Receiver platform: EMI Margin, Sensitivity, Availability, Desense, Noise In-Band EMI Margin.</li> <li>● Power Spectral solver should provide RF interference of Multiple Transmitter to the single receiver.</li> <li>● Power Spectral solver should support Non-Linear Interference Effects in RF interference analysis.</li> </ul>	
4	<p><b>Nuhertz Filter Solutions</b></p> <ul style="list-style-type: none"> <li>▪ RF and Digital Filter Synthesis and Design</li> <li>▪ Performance specification for Layout-to-EM-Optimization in a single smooth workflow</li> <li>▪ Ability to evaluate the widest range of filter topologies (Bessel, Butterworth, Chebyshev I and II, Elliptic, Gaussian, Delay, Hourglass, Legendre, Matched, Raised Cosine, Tubular, Zigzag, Coupled-Resonator and Cross-Coupled Folded Resonator)</li> <li>▪ Highly accurate distributed filter layout synthesis based on EM-derived model discontinuities and couplings</li> <li>▪ Integrates with HFSS for gold-standard EM analysis accuracy and for EM-based optimization</li> <li>▪ Ability to synthesize filter topologies for analog and digital filter topologies; a single tool for creating accurate filters for both analog and digital signal processing (DSP) applications</li> <li>▪ Planar filter realizations in the widest available media classes (microstrip, stripline, asymmetric stripline, suspended substrate)</li> </ul>	
5	<p><b>EMC Plus</b></p> <ul style="list-style-type: none"> <li>▪ Finite Difference Time Domain Analysis</li> <li>▪ Multi-Conductor Transmission Line Analysis</li> <li>▪ Two-Way Coupling FDTD and Transmission Line Solver</li> <li>▪ Twisted Conductors</li> <li>▪ Seam Impedance</li> <li>▪ Cable Junctions</li> <li>▪ Braided Shield Support</li> </ul>	

	<ul style="list-style-type: none"> <li>▪ Pin Voltage, Current Density, Plane Wave Excitations</li> <li>▪ Multi-Conductor and Multi-Shield Support</li> <li>▪ Uses SpaceClaim Design Modeler UI</li> <li>▪ Thin Surface and Thin Wire Algorithm</li> </ul>	
6	<p><b>Charge Plus</b></p> <ul style="list-style-type: none"> <li>▪ Internal Charging</li> <li>▪ Electrostatic Discharge in Air</li> <li>▪ Surface Charging</li> <li>▪ 3D Particle Transport</li> <li>▪ Arcing in Solid Dielectrics</li> <li>▪ Coupled Charging Simulations</li> </ul>	
7	<p><b>Graphical User Interface for EM analysis</b></p> <p>The software package should have the following features:</p> <ul style="list-style-type: none"> <li>• Tools should have an option or toolkit to automatically setup simulations for following RCS/Radar simulation: Range Profile, ISAR, Range Doppler Processing and waterfall.</li> <li>• The tool should have an option to encrypt the 3D component, which a user can share with others without revealing the IP</li> <li>• The tool should have an option to import/export encrypted/unencrypted 3D component models for simulation.</li> <li>• The tool should have templates for setting up EMI EMC simulation like Radiated Emission, Conducted Emission, ESD, BCI</li> <li>• The tool should have the capability to model and parameterize any arbitrary 3D model.</li> <li>• The tool should have the capability to do operations such as unite, subtract, intersect different objects to create a model</li> <li>• There should be a provision for creating equation-based curves/surfaces for creating more complex models.</li> <li>• There should be provision for wrapping sheets onto curved surfaces.</li> <li>• The software should have the ability to import, edit, simplify and parameterize 3D CAD models from third-party tools.</li> <li>• The capability to clean up 3D CAD and detection tools for Short Edges, Overlap Faces, Corrupt Faces.</li> <li>• The tool should allow users to edit STL files directly and leverage automatic repair tools.</li> <li>• Options for cleaning imported 3D models <ul style="list-style-type: none"> <li>○ Options for analyzing individual objects of the complete 3D model to locate any faults in the modelling.</li> <li>○ Possibility to find inter-object misalignments.</li> </ul> </li> <li>• There should option for healing the geometry.</li> <li>• There should be provision to model layouts into a stackup based environment and simulate in the same environment.</li> <li>• Layout interface should have options to change the stackup, trace widths, via and padstack..</li> <li>• PCB Trace modelling options in the Layout interface <ul style="list-style-type: none"> <li>○ Surface roughness – Huray and Groisse.</li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>○ Options for Etching.</li> </ul>	
8	<p><b>Import ECAD/MCAD</b></p> <ul style="list-style-type: none"> <li>● Integrated design flow that allows user to easily import design geometry from commercial layout packages such as: <ul style="list-style-type: none"> <li>○ Cadence Allegro and APD,</li> <li>○ Sigrity UDP,</li> <li>○ Zuken CR5000, CR8000,</li> <li>○ Mentor Board Station, Expedition, and PADS Layout,</li> <li>○ Altium Designer,</li> <li>○ DXF and GDSII files.</li> </ul> </li> <li>● Ability to import circuit component models of various types like, <ul style="list-style-type: none"> <li>○ HSPICE and spectre models</li> <li>○ IBIS models, including IBIS-AMI</li> <li>○ W-element</li> <li>○ S-parameters, as Touchtone, CITI files</li> <li>○ X-parameters</li> <li>○ Verilog libraries</li> </ul> </li> <li>● Ability to import Chip Power Model (CPM) for the die/IC, to perform accurate power integrity analyses.</li> <li>● 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</li> <li>● 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</li> </ul>	
9	<p><b>Mesh Options</b></p> <ul style="list-style-type: none"> <li>● Use tetrahedron element for 3D models and triangles for sheet structures (HFSS/Q3D/MAXWELL)</li> <li>● Option to have curvilinear mesh elements for accurately solving curved geometries (HFSS)</li> <li>● Mesh Control (HFSS/Q3D/MAXWELL)</li> <li>● Options to specify surface deviation, normal deviation and aspect ratio to control mesh density(HFSS/Q3D/MAXWELL)</li> <li>● 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)</li> <li>● Skin-depth based seeding capability (HFSS)</li> </ul>	

	<ul style="list-style-type: none"> <li>• 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)</li> <li>• Phi mesher (Prism elements) for faster meshing of the planar structures (HFSS).</li> <li>• Provision of automatic &amp; manual meshing to be available (Icepak)</li> <li>• Automatic meshing for fluid &amp; solid regions to be available(Icepak)</li> <li>• Different type of mesh models like body fitted Cartesian mesh etc. to be available to represent complain shapes in the electronic model (Icepak)</li> </ul> <p>Ability to import external mesh in addition to native mesh (Icepak)</p>	
	<p><b>Advanced Material Library which should include;</b></p> <ul style="list-style-type: none"> <li>• A comprehensive materials database containing permittivity, permeability, electric and magnetic loss tangents for common substances.</li> <li>• 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.</li> <li>• Provision for Spatially dependent material properties and boundary conditions.</li> <li>• Data base of interface materials like thermal components (manufactures like 3M, Aavid, etc).</li> <li>• Heat sinks: Standard heat sinks of different manufactures like Aavid, Thermshield etc to be provided. Minimum of 500 No's of heat sink database.</li> </ul>	
10	<p>Excitation and Boundary Condition</p> <ul style="list-style-type: none"> <li>• Excitation for Ports SYZ parameter excitation <ul style="list-style-type: none"> <li>○ Arbitrary internal and external ports – Waveport and Lumped Port</li> <li>○ Ability to solve all ports in one solution and not port-by-port</li> <li>○ Floquet ports for antenna arrays, frequency selective surfaces (FSS) and other periodic structures</li> <li>○ The software should have a provision for extracting fields/active S parameter as per user specified excitation magnitude and phase</li> </ul> </li> <li>• Option to provide voltage source and current source</li> <li>• Magnetic bias for ferrite models</li> <li>• Incident wave excitations available from following wave types: <ul style="list-style-type: none"> <li>○ Plane Wave, Hertzian dipole wave, Cylindrical wave, Gaussian Beam Wave</li> <li>○ Linear Antenna wave, Far Field Wave, Near Field Wave</li> <li>○ Far-field wave and near field wave can be from another design or the measurement.</li> </ul> </li> <li>• Boundary conditions available: <ul style="list-style-type: none"> <li>○ Radiating, perfectly matched layers and FEBI</li> <li>○ Impedance boundary</li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>○ Layered Impedance with shell elements which can account for thickness even when modelled as sheets</li> <li>○ Lumped RLC boundary</li> <li>○ Symmetry boundary for reducing the problem size</li> <li>○ Period boundary condition for solving arrays</li> <li>○ Finite conductivity boundary with the capability to include metal roughness using Huray or Grosse algorithm</li> <li>○ Fresnel Boundary</li> </ul>	
11	<p>General Solver Options</p> <ul style="list-style-type: none"> <li>● Direct or Iterative approach for solving the matrices</li> <li>● Hybrid solver with Integral equation solver should support matrix solving with ACA (Adaptive Cross Approximation) or MLFMM (multilevel fast multipole method).</li> <li>● Basis functions are available as zero, first, second and mixed order for simulation of various class of problems.</li> <li>● Import mesh to design from other similar design</li> <li>● Frequency sweep options <ul style="list-style-type: none"> <li>○ Interpolation sweep</li> <li>○ Discrete sweep</li> <li>○ Fast sweep</li> </ul> </li> <li>● Broadband frequency sweeps with the capability to take into account dispersive ports, materials and skin effect.</li> <li>● Enforce passivity / enforce causality for the broadband sweep</li> <li>● DC point solver option for PCBs for accurate DC point characterization</li> <li>● The asymptotic solver should enable all SBR solver like PTD, UTD, and CW in a single simulation</li> <li>● PO and SBR+ asymptotic solver should support lossy dielectrics</li> <li>● SBR solver should support multilayer dielectrics</li> <li>● FEM frequency-domain solver should have the capability to simulate even in THz region for applications such as metamaterials, FSS etc.</li> <li>● There should be an option of using 2.5D MOM or FEM solver to analyze planar layouts.</li> <li>● Solution convergence and control: Convergence based on S parameter, field quantities or user-defined expressions</li> <li>● The software should have the capability for adaptive meshing across different frequencies of broadband structures.</li> <li>● Eigenmode solver should be able to find the natural resonances and quality factor of the lossy structure.</li> <li>● The solver (FEM) should have an option to <ul style="list-style-type: none"> <li>○ physically divide the simulation model into the different sections</li> <li>○ Enable parallel meshing and solving for each section individually</li> </ul> </li> <li>● Solver has the capability for solving a single unit cell of an array for Active Element Patterns using Periodic Boundary Conditions</li> <li>● The solver should have the ability to create and solve Finite Array Simulation by combining different types of unit cells.</li> </ul>	



	<ul style="list-style-type: none"> <li>• Finite Array simulation should support features like Array Mask creation for arbitrary sparse array configuration.</li> <li>• Scattered field simulation for solving RCS problems. Provision for both bistatic and monostatic RCS along with incident field excitations.</li> <li>• RCS calculation should be able to conduct with FEM, IE and SBR+ solvers</li> <li>• RCS simulation using SBR solver should automatically combine additional solvers like PTD, UTD and CW in a single design</li> <li>• Broadband frequency sweeps with the capability to take into account dispersive ports, materials and skin effect.</li> <li>• The IE and SBR should have an option to create an ISAR image, Near Filed Radar ROM (Waterfall plot) of the Radar target</li> <li>• SBR+ Radar simulation should support Pulsed Radar and FMCW Radar</li> <li>• Capability to generate raw IQ data from Radar simulation (FMCW)</li> <li>• Multitpaction solver should support multiple port simultaneous excitations for RF breakdown analysis</li> <li>• Basic Solver should enable 4 cores HPC (High Performance Computation) capability.</li> <li>• 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</li> <li>• SBR solver should have the ability to simulate Radar Simulation <ul style="list-style-type: none"> <li>○ Able to incorporate multiple transmitting and receiving antenna</li> <li>○ Able to create Radar simulation scenarios</li> <li>○ Scenario simulation with respect to time</li> </ul> </li> <li>• Calculate Range, Velocity and Angle of Arrival</li> <li>• Types of flow for thermal analysis: <ul style="list-style-type: none"> <li>○ Laminar, transition &amp; turbulent flows</li> <li>○ Ability to model multiple fluids.</li> </ul> </li> <li>• Transient, steady state and parametric analysis (Thermal)</li> <li>• Joule heating in objects with temperature dependent properties supported</li> <li>• In case of transient simulation, ability to model variables as a function of time (Thermal).</li> <li>• Bi-directional coupling with Q3D, Maxwell, HFSS for node to node EM loss mapping and coupled electro-thermal simulation</li> <li>• Bi-directional coupling with SIwave for electro-thermal analysis with automatic transfer of power dissipation on PCB along with temperature dependency on material properties</li> </ul> <p>Importing of Chip Thermal model powermap from Apache Redhawk for accurate power dissipation from chip level tool</p>	
12	<p>Pre-Processing Options</p> <ul style="list-style-type: none"> <li>• Ability to perform package merge with PCB.</li> <li>• Advanced and easy-to-use layout-based GUI allowing users to easily manipulate layouts, with features as follows: <ul style="list-style-type: none"> <li>○ trace drawing utilities,</li> <li>○ layer stackup editor,</li> <li>○ padstack editors,</li> </ul> </li> </ul>	

	<ul style="list-style-type: none"> <li>○ add bondwire - standard JEDEC bondwire, non-standard bondwire,</li> <li>○ solderball and bump creation utilities,</li> <li>○ generate 3D models of selected nets, areas or both</li> <li>○ pin grouping</li> <li>● Ability to import Chip Power Model (CPM) for the die/IC, to perform accurate power integrity analyses.</li> <li>● 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.</li> <li>● 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.</li> <li>● Should be able to identify electronics objects from the imported CAD geometry and convert them automatically in native objects (Icepak)</li> </ul> <p>Import power maps in form of X, Y, Z, P. X, Y and Z are the coordinates and P is the heat flux</p>	
13	<p><b>Post-processing options-</b> The output from the tool should be</p> <ul style="list-style-type: none"> <li>● Network parameters like SYZ</li> <li>● Characteristic port impedances and propagation constants</li> <li>● Capability to observe near field and far-field radiations</li> <li>● Far field antenna parameters like <ul style="list-style-type: none"> <li>○ Gain</li> <li>○ Directivity</li> <li>○ Radiation efficiency</li> <li>○ Axial ratio</li> </ul> </li> <li>● Capability to observe co-pol and x-pol antenna patterns</li> <li>● Observe antenna array patterns based on array factor and pattern multiplication</li> <li>● Characterize RCS of structure <ul style="list-style-type: none"> <li>○ Monostatic RCS and Bistatic RCS</li> </ul> </li> <li>● SAR plot</li> <li>● 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</li> <li>● 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.</li> <li>● The electromagnetic solver should have the option to export s parameter data in touchstone format, generate equivalent RLG models, export W element model, export equivalent spice models</li> <li>● Field Animation <ul style="list-style-type: none"> <li>○ Capability to animate E-field/H-field and Current density</li> </ul> </li> <li>● User Defined Field Calculations using Field Calculator</li> <li>● RF Link Budget analysis: using simulation or measured data</li> </ul>	

	<ul style="list-style-type: none"> <li>• Option to add rain and atmospheric attenuation in RF interference and Link budget calculation.</li> <li>• 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</li> <li>• The tool should have option or toolkit to automatically post process and display the following RCS/Radar outputs: Range, Range Doppler, ISAR, Waterfall</li> <li>• The tool should have option or toolkit to automatically calculate Power Density and Cumulate Derivative Function from phased array or antenna simulations</li> <li>• 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.</li> <li>• Ability to simulate for TDR and TDT for specified nets in design</li> <li>• Provide impedance scan feature to quickly examine trace impedance profiles and identify any violations according to user chosen criteria</li> <li>• Provides two-way coupling with thermal or electronics cooling solver to solve for joule heating</li> <li>• Perform QuickEye analysis, a pattern-dependent convolution based approach to calculate eye diagram from transient analysis of single transitions.</li> <li>• Perform VerifEye analysis using a fully statistical approach to calculate the BER directly.</li> <li>• Perform IBIS-AMI analysis allowing time-domain simulation of a linear channel using customer-supplied models for the transmitter and receiver.</li> </ul> <p>Direct integration with HSPICE simulation software, allowing transient simulations with HSPICE and also plot results directly from HSPICE output data files.</p>	
14	<p><b>Advanced analysis features and parallel solve</b></p> <ul style="list-style-type: none"> <li>• Analytical derivatives to find output sensitivity to design parameters without resolving structure.</li> <li>• Capability for simulation of very large models across a network of machines using all of the available memory using Domain Decomposition.</li> <li>• Data link for field-to-field 3D electromagnetic linking – Enabling fields from one simulation to be used as source in another simulation.</li> <li>• Dynamic link for circuit and EM co-simulation with smith tool capability for matching circuit design.</li> <li>• The capability of tools to integrate with other application such as Thermal, Mechanical for Multiphysics Problems</li> <li>• Should be capable of doing: <ul style="list-style-type: none"> <li>○ Queuing the projects for solving</li> <li>○ Support for remote analysis with client and server each on any supported platforms</li> </ul> </li> <li>• 64-Bit Support: <ul style="list-style-type: none"> <li>○ The software should be able to support 64-bit CPU architecture on Windows and Unix Operating system for both solver and user interface.</li> <li>○ Should support unbounded 64-bit Solver Memory allocation.</li> </ul> </li> </ul>	

15	<p><b>Optimetrics – For optimizing designs</b></p> <ul style="list-style-type: none"> <li>• Integrated optimization capability including: <ul style="list-style-type: none"> <li>○ Parametric analysis</li> <li>○ Optimization analysis</li> <li>○ Sensitivity analysis</li> <li>○ Statistical analysis</li> </ul> </li> <li>• Optimizer should have these algorithms: <ul style="list-style-type: none"> <li>○ Pattern search algorithm</li> <li>○ Quasi-Newton search algorithm</li> <li>○ Sequential Non-Linear Programming (SNLP) Optimizer</li> <li>○ Genetic optimization algorithm</li> <li>○ Link to Matlab for custom optimization codes</li> <li>○ Screening (Shifted Hammersley)</li> <li>○ MOGA (Multi-Objective Genetic Algorithm)</li> <li>○ NLPQL (Non-linear Programming by Quadratic Lagrangian)</li> <li>○ MISQP (Mixed-Integer Sequential Quadratic Programming Method)</li> <li>○ Adaptive Multiple-Objective</li> </ul> </li> <li>• Analytical derivatives to find output sensitivity to design parameters without resolving structure.</li> <li>• Capability to solve parametric variations of a design in parallel using processor cores in a single machine or spread over networks</li> </ul>	
16	<p><b>Automation and distributed computing</b></p> <ul style="list-style-type: none"> <li>• Scripting options for model creations, plotting, exporting results thus providing automation</li> <li>• Scripting languages <ul style="list-style-type: none"> <li>○ VB script</li> <li>○ Iron python script</li> <li>○ Java script</li> </ul> </li> <li>• Able to use multiple cores in simulation for faster simulations. <ul style="list-style-type: none"> <li>○ Multiple cores can be a single machine or across the network</li> </ul> </li> <li>• Domain Decomposition Method for solving electrically large model <ul style="list-style-type: none"> <li>○ Automatically break the large problem into smaller domains and solve them in parallel</li> </ul> </li> <li>• Distribute frequency points and solve in parallel</li> <li>• Should be capable to Queue the projects for solving</li> <li>• Support for remote analysis with client and server each on any supported platforms</li> </ul>	
17.	<p>Package Should Contain Ansys Motorcad with following modules &amp; Capabilities</p> <ul style="list-style-type: none"> <li>• Electromagnetic, thermal, structural, laboratory</li> <li>• Evaluate motor topologies and concepts across the full operating range and produce designs that are optimized for size, performance and efficiency</li> </ul>	
18	<p><b>Maxwell Simulation</b></p> <ul style="list-style-type: none"> <li>• Low-frequency electromagnetic field simulation and analysis using FEM for 3D, 2D structures.</li> </ul>	

	<ul style="list-style-type: none"> <li>• Solve static, frequency domain and time-varying</li> <li>• electromagnetic and electric fields including quasi static parameters.</li> </ul>	
19	<p>Modelling</p> <ul style="list-style-type: none"> <li>• Electric motors and generators, transformers, busbars, relays, solenoids, power electronics both individually and as a complete system including any or all of the above</li> </ul>	
20	<p>Types of analysis</p> <ul style="list-style-type: none"> <li>• Electromagnetic Analysis</li> <li>• Magnetostatic Analysis</li> <li>• Eddy Current Analysis</li> <li>• Transient Magnetic Analysis</li> <li>• Electrostatic Analysis</li> <li>• DC Conduction Analysis</li> <li>• Electric Transient Analysis</li> </ul>	
21	<p>Transient-nonlinear analysis</p> <ul style="list-style-type: none"> <li>• Motion-rotation, translational, non-cylindrical rotation including animation for various parameters.</li> </ul>	
22	<p>Capability of Maxwell Em solvers</p> <ul style="list-style-type: none"> <li>• Solvers that accurately solve for force, torque, capacitance, inductance, resistance, and impedance, as well as generate both nonlinear equivalent circuits, and state-space models to be employed into the further system and circuit simulation analysis.</li> </ul>	
23	<p>Extended Analysis</p> <ul style="list-style-type: none"> <li>• External circuit coupling</li> <li>• Permanent magnet demagnetization analysis</li> <li>• Core loss computation</li> <li>• Time domain transient solver</li> <li>• Lamination modelling for 3-D</li> </ul>	
24	<p>AC electromagnetic</p> <ul style="list-style-type: none"> <li>• Analysis of devices influenced by skin/proximity effects, eddy/displacement currents.</li> </ul>	
25	<p>Magnetostatic</p> <ul style="list-style-type: none"> <li>• Nonlinear analysis with automated equivalent circuit model generation</li> </ul>	
26	<p>Electric Field</p> <ul style="list-style-type: none"> <li>• Transient, electrostatic/current flow analysis with automated equivalent circuit model generation</li> </ul>	
27	<p>Mesh Creation</p>	

	<ul style="list-style-type: none"> <li>• Automatic, adaptive mesh creation</li> <li>• Fault-tolerant meshing algorithms</li> <li>• Mesh-generation feedback</li> <li>• Mesh-based model resolution</li> </ul>	
<b>28</b>	<p>Display of data/visualization of results</p> <ul style="list-style-type: none"> <li>• Field visualization and animations (shaded, contour and vector plots)</li> <li>• Mesh visualization</li> <li>• Current, induced voltage, flux linkage</li> <li>• Power loss, stored energy</li> <li>• Core loss, eddy, excess, hysteresis loss (including the minor loop effects)</li> <li>• Impedance, inductance, capacitance</li> <li>• Flux linkages, Back emf - readymade plots apart from Torque, speed, current</li> <li>• Custom reports of user-defined solution data</li> </ul>	
29	<p>Multiphysics Analysis</p> <ul style="list-style-type: none"> <li>• Project schematic view for multiuser environments and coupling with</li> <li>• Multiphysics tools- Link to Thermal, Fluent, Structural analysis</li> </ul>	
30	<p>Scripting</p> <ul style="list-style-type: none"> <li>• VB Script, Java Script and Python Script support</li> </ul>	
31	<p>Excitation</p> <ul style="list-style-type: none"> <li>• Data table, current, voltage, function, external circuit, circuit editor within the FE tool for external excitation and link to Simpler for co-simulation</li> </ul>	
<b><u>32</u></b>	<p>Automatic Post Processing</p> <ul style="list-style-type: none"> <li>• Machine design toolkit for automated postprocessing</li> <li>• FEM analysis with Python scripting support</li> </ul>	
<b><u>33</u></b>	<p>Calculator</p> <ul style="list-style-type: none"> <li>• Field calculator for evaluating complex equations and set convergence criteria for parametric analysis</li> </ul>	
<b><u>34</u></b>	<p>Magnetisation</p> <ul style="list-style-type: none"> <li>• Element-by-element or object-based magnetization capability based on the original non-remnant B(H)-curve for both ferromagnetic materials and permanent magnets.</li> <li>• Study the permanent magnet demagnetization characteristics extended into the third quadrant.</li> </ul>	
<b><u>35</u></b>	<p>Design template available for machines</p> <ul style="list-style-type: none"> <li>• Induction machines</li> <li>• Single-phase motors</li> <li>• Three-phase motors</li> <li>• Wound-rotor motors and generators</li> </ul>	

	<ul style="list-style-type: none"> <li>• Synchronous machines</li> <li>• Line-start PM motors</li> <li>• Salient-pole motors and generators</li> <li>• Non-salient pole motors and generators</li> <li>• Brush commutated machines</li> <li>• DC motors and generators</li> <li>• Permanent magnet DC motors</li> <li>• Universal motors</li> <li>• Electronically commutated machines</li> </ul>	
36	<ul style="list-style-type: none"> <li>• Brushless DC motors</li> <li>• Adjustable-speed PM motors and generators</li> <li>• Switched reluctance motors</li> <li>• Claw-pole generators</li> <li>• Synchronous Reluctance Motor</li> </ul>	
37	<p>Machine-specific template editor</p> <ul style="list-style-type: none"> <li>• Rotor, stator, Slots, Running strategies, Drive circuits, Auto-design feature</li> <li>• Slot size, Coil turns and wire diameter, Starting capacitance, Winding arrangement, Graphical winding editor, cross section editor, customizable design sheet, Entry of insulation thickness</li> </ul>	
38	<p>Slot and winding editor</p> <ul style="list-style-type: none"> <li>• Option to draw any slot shape using predefined templates and winding table entry option for variable pitch, variable turns winding</li> </ul>	
39	<p>Machine Design evaluation</p> <ul style="list-style-type: none"> <li>• Performance curves, Torque, Power, Efficiency, Output Waveforms, Current, Cogging torque, Flux in the air gap, Cost evaluation</li> </ul>	
<u>40</u>	<p>Load Options</p> <ul style="list-style-type: none"> <li>• Fan load, constant torque, constant speed, constant power</li> </ul>	
<u>41</u>	<p>FE Model generation</p> <ul style="list-style-type: none"> <li>• Create Finite element 2D &amp; 3D models for all the motor mentioned above including automatic setup of external circuit for permanent magnet machines</li> </ul>	
<u>42</u>	<p><b>Complete system design- Twinbuilder / Simplorer</b></p> <p>Model, simulate, analyse, optimize complex systems including electromechanical, electromagnetic, power electronics and other mechatronic designs</p> <p>Prototype all aspects of a system including the electronics, sensors, actuators, motors, generators, power converters, controls and embedded software</p>	
<u>43</u>	<p>Modelling Techniques</p> <ul style="list-style-type: none"> <li>• Circuits-fast and numerically stable circuit simulation. Includes multilevel semiconductor modeling, and powerful data exchange between models</li> </ul>	

	<ul style="list-style-type: none"> <li>• Block Diagrams - signal flow-based models for linear, nonlinear, continuous, time-discrete hybrid-systems</li> <li>• State Machines - event driven approach for complex modeling and logic control (i.e. space vector control, PWMs)</li> <li>• Equation Blocks - quickly include equation-based modeling in the system</li> <li>• State Space Modeling - based on External matrix of multi-domain components</li> </ul>	
<u>44</u>	Modelling Languages <ul style="list-style-type: none"> <li>• VHDL-AMS, CIC++, SML, Python</li> </ul>	
<u>45</u>	Design domains <ul style="list-style-type: none"> <li>• Analog, digital, and mixed signal multi-domain designs</li> </ul>	
<u>46</u>	Device Characterisation <ul style="list-style-type: none"> <li>• Characterisation of IGBTs and other semiconductor devices</li> </ul>	
<u>47</u>	Integrated Development Environment <ul style="list-style-type: none"> <li>• Develop virtual prototypes that can be shared among hardware and software design groups allowing users to emulate hardware and simulate the software</li> </ul>	
<u>48</u>	Library <ul style="list-style-type: none"> <li>• Auto Library,</li> <li>• System Level Components Library</li> <li>• Device Level Component Library</li> </ul>	
<u>49</u>	Post-processing <ul style="list-style-type: none"> <li>• 2-D and 3-D families display</li> <li>• 2-D and 3-D polar families display views</li> <li>• Digital plots with families display</li> <li>• Rectangular stacked families display</li> <li>• Bode and Nyquist families display</li> <li>• Interactive data table view</li> <li>• Histogram</li> <li>• Sensitivity report</li> <li>• Range function capabilities</li> </ul>	
<u>50</u>	Scripting <ul style="list-style-type: none"> <li>• Visual Basic, Java</li> </ul>	
<u>51</u>	Co-Simulation <ul style="list-style-type: none"> <li>• Direct coupling with FE Analysis tools for analysing the component modelled</li> </ul>	
<u>52</u>	Coupling	



	<ul style="list-style-type: none"> <li>Finite element methods for further system analysis (including circuit, thermal, stress etc)</li> </ul>	
<u>53</u>	<p>Co-Simulation and Model Generation</p> <ul style="list-style-type: none"> <li>Third Party products- MATLAB/Simulink, MathCAD, C / C++, ModelSim, QuestaSim, RTW, HFSS, Unigraphics, Slwave, Fluent, ANSYS Rigid Dynamics, ANSYS Mechanical</li> </ul>	
<u>54</u>	<p>Design</p> <ul style="list-style-type: none"> <li>Template driven Waveform based inductor and transformer design</li> </ul> <p>Template driven inductor and transformer design for boost, buck, flyback converter etc.</p>	

### 3. Technical specifications of Ansys LS-DYNA Software

Sl. No.	Description	Compliance (Yes / No)
	<p>Geometric Modelling</p> <ul style="list-style-type: none"> <li>✓ IGES File</li> <li>✓ STEP File</li> <li>✓ STL File</li> </ul>	
	<p>Elements</p> <ul style="list-style-type: none"> <li>✓ Beams (Standard, Trusses, Discrete</li> <li>✓ Cables and Webs with over 10 Beam</li> <li>✓ Element Formulations) <ul style="list-style-type: none"> <li>✓ Discrete Elements (Springs and Dampers)</li> <li>✓ Lumped Inertial</li> <li>✓ Lumped Masses</li> <li>✓ Accelerometers</li> <li>✓ Sensors</li> <li>✓ Seatbelts (Pretensioners, Retractors, Sliprings)</li> <li>✓ Shells (3,4,8 and 8-Node including 3D shells, Membranes, 2D Plane Stress, Plane Strain, and Axisymmetric Solids with over 25 Shell Elements Formulations)</li> <li>✓ Solids (4 and 10-Node Tetrahedrons, 6-Node Pentahedrons with Over 20 Solid Elements Formulations)</li> <li>✓ SPH Elements</li> <li>✓ Thick Shells (8-Node)</li> </ul> </li> </ul>	
	<p>Meshing</p> <ul style="list-style-type: none"> <li>✓ Shape Mesher</li> <li>✓ Auto Mesher</li> <li>✓ Solid Mesher</li> <li>✓ Block Mesher</li> <li>✓ N-Line Mesher</li> </ul>	

	<ul style="list-style-type: none"> <li>✓ 2D Mesher</li> <li>✓ Tetrahedron Mesher</li> <li>✓ Blank Mesher</li> <li>✓ BulkF Mesher</li> <li>✓ Element Generation</li> <li>✓ SPH Generation</li> <li>✓ Disc Shpere Generation</li> <li>✓ Multiple Solver Mesh</li> </ul>	
	<p>Material Library</p> <ul style="list-style-type: none"> <li>✓ Metals</li> <li>✓ Plastics</li> <li>✓ Glass</li> <li>✓ Foams</li> <li>✓ Fabrics</li> <li>✓ Elastomers</li> <li>✓ Honeycombs</li> <li>✓ Concrete &amp; Soils</li> <li>✓ Viscous Fluids</li> <li>✓ Composites</li> <li>✓ Cohesive Material Models</li> <li>✓ User-Defined Materials</li> <li>✓ Features In Material Models <ul style="list-style-type: none"> <li>➤ Failure <ul style="list-style-type: none"> <li>➤ Equation of State <ol style="list-style-type: none"> <li>1. Linear Polynomial</li> <li>2. JWL</li> <li>3. Sack Tuesday</li> <li>4. Gruneisen</li> <li>5. Ratio of Polynomials</li> <li>6. Linear Polynomial with Energy Leak</li> <li>7. Ignition and Growth of Reaction in HE</li> <li>8. Tabulated Compaction</li> <li>9. Tabulated</li> <li>10. Ideal Gas</li> <li>11. Phase Change</li> <li>12. Gasket</li> <li>13. MIE Gruuneisen</li> <li>14. Murnaghan</li> <li>15. User Defined EOS etc.</li> </ol> </li> <li>➤ Anisotropic</li> <li>➤ Damage</li> <li>➤ Unique Tension/Compression</li> <li>➤ Thermal</li> </ul> </li> </ul> </li> </ul>	
	<p>Pre-Processing</p> <ul style="list-style-type: none"> <li>✓ Interactive Intuitive Interface</li> <li>✓ Integrated with solver and post-Processor</li> <li>✓ Wizard for Ease of setup</li> </ul>	

	<ul style="list-style-type: none"> <li>✓ Visual Checking of Data</li> <li>✓ Data Checking During Model Creation</li> <li>✓ Comprehensive Restarting Capabilities: All valid Data can be Modified/Added/Removed at any stage</li> <li>✓ Material Data Libraries (250+)</li> <li>✓ Context-Sensitive Online Help</li> <li>✓ Enabling Keyword Commands</li> </ul>	
	<p>Boundary Conditions and Loads</p> <ul style="list-style-type: none"> <li>✓ Initial Conditions</li> <li>✓ Translational Velocities</li> <li>✓ Angular Velocity</li> <li>✓ Gravity</li> <li>✓ Arbitrary Time Varying</li> <li>✓ Energy Deposition</li> <li>✓ Pressure</li> <li>✓ Point Load</li> <li>✓ Edge Load</li> <li>✓ Fluid/Material Flow Inlet</li> <li>✓ Fluid/Material Flow Outlet</li> <li>✓ Rigid Wall</li> <li>✓ Translational Velocity Constraint</li> <li>✓ Rotational Velocity Constraint</li> <li>✓ Angular Velocity Constraint</li> <li>✓ Blast Loads</li> <li>✓ Mask Loads for Forming Applications</li> <li>✓ Prescribed Boundary Conditions (Displacement Velocity and Acceleration)</li> <li>✓ Boundary Single Point Constrain</li> <li>✓ Reflecting and Non-Reflecting Boundary Conditions</li> <li>✓ Temperature Boundary Conditions</li> <li>✓ Ambient Boundary Conditions</li> <li>✓ Symmetry Boundary Conditions</li> </ul>	
	<p>Contact Algorithms</p> <ul style="list-style-type: none"> <li>✓ Flexible Body Contact</li> <li>✓ Flexible Body to Rigid Body Contact</li> <li>✓ Rigid Body to Rigid Body Contact</li> <li>✓ Edge-To-Edge Contact</li> <li>✓ Eroding Contact</li> <li>✓ Tied Surfaces</li> <li>✓ CAD Surfaces</li> <li>✓ Rigid Walls</li> <li>✓ Draw Beads</li> </ul>	
	<p>Solvers Methods</p> <ul style="list-style-type: none"> <li>✓ Full 2D and 3D Capabilities</li> <li>✓ Nonlinear Dynamics</li> <li>✓ Rigid Body Dynamics</li> </ul>	

	<ul style="list-style-type: none"> <li>✓ Explicit Analysis</li> <li>✓ Implicit Analysis</li> <li>✓ Quasi-Static Simulations</li> <li>✓ NVH, Fatigue and Frequency Domain Analysis</li> <li>✓ BEM (Boundary Element Method)</li> <li>✓ ICFD (Incompressible Computational Fluid Dynamics)</li> <li>✓ DEM (Discrete Element Method)</li> <li>✓ XFEM (Extended Finite Element Analysis)</li> <li>✓ Normal modes</li> <li>✓ Linear Statics</li> <li>✓ Thermal Analysis</li> <li>✓ Fluid Analysis</li> <li>✓ Eulerian Capabilities</li> <li>✓ ALE (Arbitrary-Lagrange-Eulerian)</li> <li>✓ FSI (Fluid structure Interaction)</li> <li>✓ Navier-Stokes Fluid</li> <li>✓ Compression Fluid Solver, CESE (Conservation Element &amp; Solution Elements)</li> <li>✓ FEM-Rigid Multi-Body Dynamics Coupling (MADYMO, Cai3D)</li> <li>✓ Underwater Shock</li> <li>✓ Real-Time Acoustics</li> <li>✓ Implicit Springback</li> <li>✓ Multi-Physics Coupling</li> <li>✓ Structural-Thermal-Coupling</li> <li>✓ Adaptive Remeshing</li> <li>✓ SPH (Smoothed Particle Hydrodynamics)</li> <li>✓ SPG (Smooth Particle Galerkin)</li> <li>✓ EFG (Element Free Galerkin)</li> <li>✓ Radiation Transport</li> <li>✓ EM (Electromagnetism)</li> </ul>	
	<p>Post-Processing</p> <ul style="list-style-type: none"> <li>✓ Visualization for Large Datasets</li> <li>✓ Interactive Intuitive Interface</li> <li>✓ Integrated with Solver and Pre-Processor</li> <li>✓ Animation wizard and Editor</li> <li>✓ Stand-Alon Free Viewer for 2D and 3D Animations</li> <li>✓ Contour and Isosurfaces</li> <li>✓ Element Examine Probe</li> <li>✓ Vectors</li> <li>✓ Material Location and Status</li> <li>✓ Gauge Time History plotting</li> <li>✓ Part Histories</li> <li>✓ Result Profile</li> <li>✓ Multiphysics Result Visualization with LS-PrePost</li> </ul>	

#### 4. Technical Specifications for Process Integration and Design Optimization software

Sl. No.	Description	Compliance (Yes / No)
1	Supply, Installation and Commissioning of software for process integration and design optimization along perpetual floating license.	
2	The software shall be licensed, well proven and established in the market. Software shall be compatible with Microsoft Windows 10. Software should have multicore processing capability during supply and shall have option to choose number of domain and cores for solver	
3	The Software shall be capable of integrating the tools with either direct integration or using ASCII input/ouput interface.	
4	<p>The Software shall be capable to following studies</p> <ul style="list-style-type: none"> <li>• Sensitivity study</li> <li>• Optimization study</li> <li>• Robustness study</li> <li>• Reliability study</li> <li>• Robust design optimization</li> </ul>	
5	<p>The software shall be having following algorithms for sensitivity studies</p> <ul style="list-style-type: none"> <li>• Full Factorial</li> <li>• Central composite</li> <li>• D-optimal</li> <li>• Advanced Latin Hypercube</li> <li>• Monte Carlo</li> <li>• Space filling</li> <li>• Adaptive MOP</li> </ul>	
6	<p>Software shall have the Metamodal of optimal prognosis technique for regression modal creation. Following algorithm are essential for regression modal creation</p> <ul style="list-style-type: none"> <li>• Polynomial</li> <li>• Moving Least square</li> <li>• Genetic Aggregation Response surface</li> <li>• Deep feed forward Network</li> <li>• Support vector Regression</li> <li>• Signal MOP</li> </ul>	
7	<p>Software shall have the following features for postprocessing of sensitivity study</p> <ul style="list-style-type: none"> <li>• 2D/3D anthill plot</li> <li>• Parallel Coordinate plot</li> <li>• Spider Plot</li> <li>• COP Matrix</li> <li>• Residual Plot</li> </ul>	
8	<p>The software shall be capable of optimization. Following methodologies should be available</p> <ul style="list-style-type: none"> <li>• Adaptive Response Surface</li> <li>• Downhill Simplex Method</li> <li>• Non-linear Programming by Quadratic Lagrangian</li> <li>• Adaptive Multiple Objective</li> <li>• Evolutionary Algorithm</li> <li>• Particle Swarm</li> <li>• Covariance Matrix Adaptation</li> </ul>	

9	The software should have following postprocessing features <ul style="list-style-type: none"> <li>• History</li> <li>• Criteria Data</li> <li>• Pareto 2D/3D</li> </ul>	
10	Software should be capable of Robustness and Reliability study. Following Distribution function should be available <ul style="list-style-type: none"> <li>• Uniform/Normal/Truncated Normal</li> <li>• Weibull/Gumbel/Lambda</li> <li>• Exponential/triangular/Frechet</li> </ul>	
11	Software should contain following algorithm for reliability study <ul style="list-style-type: none"> <li>• First Order Reliability Method</li> <li>• Importance Sampling</li> <li>• Directional Sampling</li> <li>• Adaptive Response Surface Method</li> </ul>	
12	Software should be able to handle following parameters <ul style="list-style-type: none"> <li>• Scalar,Vector,Signal Functions</li> <li>• Continuous/Discrete Parameters</li> </ul>	
13	User Interface <ul style="list-style-type: none"> <li>• Interactive wizard-based GUI</li> <li>• User-friendly interface with drag-and-drop plugin system for tool integrations</li> </ul>	
14	Process integration <ul style="list-style-type: none"> <li>• Automation of any tool (Ansys tools / third-party tools / In house tools) which helps users in saving time and effort by eliminating repetitive tasks and facilitating efficient exploration and design alternatives</li> <li>• Create automated workflows</li> <li>• Nested loops</li> <li>• Conditional workflows</li> <li>• Collaborative work</li> <li>• Complex process chains</li> </ul>	
15	Openness <ul style="list-style-type: none"> <li>• Vendor neutral and Open for plugins and extensions</li> <li>• PLM/Database agnostic</li> <li>• Supports personalized algorithms and integrations for users</li> <li>• Offers flexibility for customization</li> </ul>	
16	Wizards <ul style="list-style-type: none"> <li>• Solver wizard</li> <li>• Sensitivity wizard</li> <li>• Optimization wizard</li> <li>• Robustness wizard</li> <li>• Reevaluation wizard</li> </ul>	
17	Algorithms <ul style="list-style-type: none"> <li>• Balance library of algorithms</li> <li>• Advance robust DOE and optimizations algorithms tailored to handle complex engineering optimization problems</li> <li>• Transparent algorithms</li> </ul>	

18	AI/ML <ul style="list-style-type: none"> <li>Leveraging AI/ML for build advance reduced order models</li> <li>Advanced surrogate modeling techniques</li> <li>OCO (One Click Optimizer): AI enhanced optimization algorithm</li> </ul>	
19	AI+ <ul style="list-style-type: none"> <li>Field Meta-modeling ,Advanced Meta-modeling for scalar values</li> </ul>	
20	Web-apps & Simulation Democratization <ul style="list-style-type: none"> <li>Publishing simulation workflows for non-experts</li> <li>Connect the Web-apps to simulation process and data management systems</li> </ul>	

## 5. Technical Specifications of Engineering Material Solution Software

Sl.No	Specifications	Compliance (Yes / No)
1.	<b>Material Data Management</b> <ul style="list-style-type: none"> <li>Multiple Unit System Support</li> <li>Browse Materials Data</li> <li>Edit and Update Materials Data</li> <li>Search and Query Materials Data</li> <li>Represent Property Data in Interactive Charts</li> <li>Export Data to Excel and Third-Party Software</li> </ul>	
2.	<b>Integration with third party/native modules for CAD, CAE, PLM</b>	
3.	<b>Materials Selection &amp; Related Tools</b> <ul style="list-style-type: none"> <li>Reference Data for Materials Selection on PC/Laptop</li> <li>Interactive 'Ashby Charts' of Materials Property Space</li> <li>Systematic Materials Selection Methodology</li> <li>Filter Materials Based on Property Profile</li> <li>Filter Materials Based on Links to Other Materials / Processes / Objects</li> <li>Performance Index Finder</li> <li>Part Cost Estimator</li> <li>Selection Reports &amp; Export of Charts for Presentations</li> <li>Eco Audit for a Product or Conceptual Design</li> </ul>	
4.	<b>Data Library – MaterialUniverse</b> <ul style="list-style-type: none"> <li>Unique materials screening dataset of around 4000 materials, compiled by materials experts</li> <li>Covers all classes of engineering materials</li> <li>Data for generic grades of materials, linked to specialist grades</li> <li>Includes technical, economic, regulatory &amp; eco data</li> <li>ProcessUniverse: <ul style="list-style-type: none"> <li>Main manufacturing processes used for shaping, joining and surface treatment</li> <li>Key process characteristics</li> <li>Process capabilities</li> </ul> </li> </ul>	

	- Cost models for primary shaping processes	
5.	<b>Teaching Resources</b> <ul style="list-style-type: none"> <li>• The elements teaching Database</li> <li>• Materials Science and Engineering Teaching Database</li> <li>• Sustainability Database</li> <li>• Bioengineering Database</li> <li>• Medical devices database</li> <li>• Architecture database</li> <li>• Science note for self-learning</li> <li>• Over 200 lectures</li> <li>• Lecture units</li> <li>• Student exercises</li> <li>• Videos</li> <li>• Micro-Projects</li> <li>• White Papers</li> <li>• Case Studies</li> <li>• Active Learning Toolkits</li> <li>• Data Booklets</li> <li>• Sample Project Files</li> <li>• Phase Diagram Tool</li> </ul>	
6	<b>User Interface</b> <ul style="list-style-type: none"> <li>• Easy to use and interactive user interface aids in searching &amp; browsing material data, systematic material selection, filtering materials based on property profile and creating Ashby charts</li> </ul>	
7	<b>Databases</b> <ul style="list-style-type: none"> <li>• The software includes key selection and data visualization tools, plus data on 4,000+ materials and 250 processes</li> <li>• Also Includes introductory resources/data on Built Environment, Materials Science and Engineering, Bioengineering, Sustainability, Design and Elements databases</li> </ul>	
8	<b>Material Universe</b> <ul style="list-style-type: none"> <li>• Covers all classes of engineering materials (4,000+ materials and 250 processes)</li> <li>• Unique materials screening dataset, compiled by Granta materials experts</li> <li>• Includes technical, economic, eco data and materials data for simulation</li> </ul>	
9	<b>Screening tools</b> <ul style="list-style-type: none"> <li>• Search and filter materials based on key requirements</li> <li>• Visualize and trade-off material properties; flag 'overlooked' properties</li> <li>• Easily implement Ashby selection methodology</li> </ul>	
10	<b>Eco audit tool</b> <ul style="list-style-type: none"> <li>• Eco audit for product or conceptual design - Life cycle awareness</li> <li>• Rapid estimation of environmental impact (Energy usage and CO2 footprint)</li> </ul>	
12	<b>Exporters</b> <ul style="list-style-type: none"> <li>• Export Data to Excel and Third-Party Software</li> <li>• Integration with third party/native modules for CAD, CAE, PLM</li> </ul>	



## 6. Technical Specification – Ansys Innovation Courses

Sl. No	Specification	Compliance Statement (Yes/No)
1.	<p><b>Comprehensive yet modular learning experience</b></p> <ul style="list-style-type: none"> <li>• Free physics and engineering fundamental courses (300+ courses across physics)</li> <li>• Simulation and application-oriented courses (900+ through ALH)</li> <li>• Application specific webinars</li> <li>• Certifications for Physics, Simulation and Applications</li> </ul>	
2.	<p><b>Enhanced customer experience</b></p> <ul style="list-style-type: none"> <li>• Unified platform with a single log in</li> <li>• Access to learning and support resources for all Ansys products</li> </ul>	
3.	<p><b>Comprehensive support experience for faster access</b></p> <ul style="list-style-type: none"> <li>• Knowledge resources for Self-help 24X7</li> <li>• Learning Forum for help from peers and Ansys experts</li> <li>• Traditional one on one customer support</li> </ul>	

## 7. Technical Specification - Ansys Learning Hub

Sl. No	Specification	Compliance Statement (Yes/No)
1.	<p><b>Online Training Courses:</b> The Learning Hub offers a variety of online training courses covering different aspects of ANSYS software, such as structural analysis, fluid dynamics, electromagnetic simulations, and more. These courses can range from introductory to advanced levels.</p>	

2.	<b>Self-Paced Learning:</b> Learners can access pre-recorded video lectures, tutorials, and hands-on exercises at their own pace. This allows for flexible learning and the ability to revisit materials as needed.	
3.	<b>Certification Programs:</b> Some Learning Hub programs might offer certification options upon completing specific courses or tracks. These certifications can validate your proficiency in using ANSYS software.	
4.	<b>Simulations and Exercises:</b> The platform might provide interactive simulations and exercises to help users practice using ANSYS software in a virtual environment.	
5.	<b>Learning Paths:</b> The Learning Hub might offer structured learning paths or tracks tailored to different roles or industries, ensuring that learners receive a comprehensive education in using ANSYS software for their specific needs.	
6.	<b>Community and Support:</b> Access to forums, discussion boards, and support channels where learners can interact with other users and experts, ask questions, and seek guidance.	
7.	<b>Updates and New Features:</b> The platform might be regularly updated with new content, courses, and features to keep up with advancements in ANSYS software.	
8.	<b>Compatibility:</b> The ANSYS Learning Hub should be accessible from a variety of devices, including desktop computers, and laptops, making it convenient for learners to access their materials.	
9	Access to virtual classes in all time zones	
10	Access to all classes at Ansys worldwide facilities	
11	Access to all self-paced video courses	
12	Learning paths to guide your course selection	
13	Dedicated learning rooms for questions and discussions	
14	Continuous learning support within the Hub from Ansys Experts	
15	Application content, best practice guides and demo videos	
16	Materials, blogs and latest updates	