Malaviya National Institute of Technology Jaipur

Jawahar Lal Nehru Marg, JAIPUR-302017 (Rajasthan)
Ministry of Education
(Government of India)

Single Tender Enquiry

For

Procurement of Antenna design simulation software tool, Altair Feko 20 users/600 Altair Units

NIT Number: F5(2912)ST/MNIT/ECE/2024 **Date:25.09.2024**

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY
JLN MARG, JAIPUR-302017

To,

M/s Altair Inc.

Or (it's authorized dealer/distributor)

M/s Design Tech Systems Pvt. Ltd,
6, Commerce Center, Rambaug Colony Paud Road,
Pune- 41038

Email id: marketing@india.altair.com

Sub: Invitation for Quote for the Purchase **"Purchase of Antenna design simulation software tool, Altair Feko (20 users/600 Altair Units)".**

Registrar, Malaviya National Institute of Technology Jaipur invites Quote from M/s. M/s Altair Inc., Or it's authorized dealer/distributor. Bidder must submit their bid online on CPP Portal as per details technical Specification given and Price Bid as per BOQ latest by 17.10.2024. The important information related to tender are as follows:

Sr. No.	Name of Item	Specifications	Quantity
01	Antenna design simulation software tool, Altair Feko 20 users/600 Altair Units 1 User/30 Altair Units	Antenna Design Simulation Software Tool, Altair Feko Enabled Via Altair Enterprise Education Bundle Commercial Grade R&D Licenses (Governed via Academia license agreement) (As per Annexure F) Node-Locked/ Floating License 64 bit, Windows/LINUX To run on maximum of 4-cores each This bundle includes: • Feko • newFasant • WinProp • WRAP	20 users/600 Altair Units

1. The bids should contain the following document:

i. Detailed technical product catalogue.

ii. Bidder should be the manufacturer / authorized dealer. In case bidder submitted the bid on behalf of OEM than Letter of Authorization from original equipment manufacturer (OEM) specific to the tender enquiry should be enclosed (as per Annexure A).

iii. A certificate from OEM to the affect that the said good/software is a proprietary item

iv. A certificate to the affect that the price quoted by you is the lowest and not more than the price quoted to other Educational Institutes in India.

v. A certificate to the affect that your firm has not been Black Listed/De Listed or put to any Holiday by any Institutional Agency/ Govt. Department/ Public Sector Undertaking in the last three years.

vi. List of industrial and educational establishments where the items enquired have been supplied is to be provided along with previous Purchase orders.

vii. Declaration of Local Content (as per Annexure-B)

2. **Validity:** The validity of the offer shall remain valid for 90 days from the date of submission of the offer.

3. **Award of Contract** MNIT, Jaipur shall award the contract to the bidder whose bid has been accepted and determined as responsive.

4. **Installation:** The supplier is required to do the installation and demonstration of the equipment / software within two days of the arrival of materials at the MNIT Jaipur, site of installation.

5. **Delivery Period: 04 Weeks.**

6. **Warranty:** Warranty period shall be (One -year comprehensive warranty from date of installation of Goods and acceptance at MNIT Jaipur. The Supplier shall, in addition, comply with the performance and/or consumption guarantees specified under the contract. If for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the Supplier shall at its discretion make such changes, modifications, and/or additions to the Goods or any part thereof as may be necessary in order to attain the contractual guarantees specified in the Contract at its own cost and expense and to carry out further performance tests. The warranty should be comprehensive on site.

7. **Payment Terms:** For Indigenous supplies, 100% payment shall be made by the Purchaser against delivery, inspection, successful installation, commissioning and acceptance of the equipment at MNIT Jaipur in good condition and to the entire satisfaction of the Purchaser.

i. GST Deduction at source as per Order/ notification of the Govt.

ii. GST No of MNIT Jaipur is **08AAAJM0351L1Z6**

iii. HSN/SAC No of the items must be clearly mentioned in the quotation along with GST No.

iv. MNIT Jaipur is exempted from paying custom duty under notification No.51/96 (partially or full) and necessary "Custom Duty Exemption Certificate" can be issued after providing following information and Custom Duty Exemption Certificate will be issued to the shipment in the name of the Institute, no certificate will be issued to third party:

8. **Performance Security**: **05**% of the contract value valid till warranty period plus 60 days. The supplier shall require to submit the performance security for an amount which is stated at the "Schedule" of the tender document within 15 days from the date of receipt of the purchase order and should be kept valid for a period of 60 days beyond the date of completion of warranty period. Performance security may be in the form of irrevocable bank guarantee issued by any commercial bank in the prescribed format **(Annexure - C)** or Demand Draft/ Banker's Cheque in favour of 'MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY' payable at JAIPUR or through NEFT/RTGS in Beneficiary name:

MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY
Account No. 676805000011
IFSC Code ICIC0006768
Bank Name ICICI BANK LTD
Branch address MNIT BRANCH

9. **Price**: the price should be quoted in BoQ format only. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable, however, the percentage of taxes & duties shall be clearly indicated.

10. **Force Majeure:** The Supplier shall not be liable for feature of its performance security, liquidated damages or termination for default, if and to the extent that, it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

- For purposes of this Clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the Purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.

- If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

11. **Defective Equipment:** If any of the equipment supplied by the Supplier is found to be substandard, refurbished, un-merchantable or not in accordance with the description/specification or otherwise faulty, the committee will have the right to reject the equipment or its part. The prices of such equipment shall be refunded by the Supplier with 18% interest if such payments for such equipment have already been made. All damaged or unapproved goods shall be returned at sup- pliers cost and risk and the incidental expenses incurred thereon shall be recovered from the sup- plier. Defective part in equipment, if found before installation and/or during warranty period, shall be replaced within 7 days on receipt of the intimation from this office at the cost and risk of sup- plier including all other charges. In case supplier fails to replace above item as per above terms & conditions, MNIT Jaipur may consider "Banning" the supplier.

12. **Liquidated Damages (L.D):** If a supplier fails to execute the order in time as per the terms and conditions stipulated therein, it will be open to the purchaser to recover liquidated damages for delay in delivery and installation from the supplier at the rate 0.5% of the value of the order per week subject to a maximum of 10% of the total order value. The L.D charges can be increased in case of gross violation of the Purchase Order terms as decided by the Director of the Institute.

13. Only "Class–I and Class-II local supplier will be eligible to bid notified vide (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020. It is mandatory for bidders to quote items having local content more than 20%. Refer revised Public Procurement (Preference to Make in India), Order 2017 P-45021/2/2017-B.E-II dated 04.06.2020 issued by DPIIT, Ministry of Commerce and Industry, Govt. of India. **(Submit duly filled Annexure B for the same)**

14. **Exemption to Startups**: If the bidder is a Startup, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer.

15. **Exemption to MSME:** If the bidder is a Micro or Small Enterprise as per latest definitions under MSME rules, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer.

16. **Preference to Make in India Products:** The Institute is following and abide with the revised Public Procurement (Preference to Make in India), Order 2017 P- 45021/2/2017 – B. E. –II dated 04.06.20 issued by DPIIT, Ministry of Commerce and Industry, Govt. of India & subsequent amendments/instructions of Ministry. Accordingly, preference will be given to the make in India products while evaluating the bids. However, it is sole responsibility of the bidder(s) to specify the product quoted by them is of Make in India along with respective documentary evidence in the technical bid itself.

17. **Genuine Pricing:** Vendor is to ensure that quoted price is not more than the price offered to any other customer in India to whom this particular item has been sold. (Annexure-D)

18. **Cancellation:** MNIT Jaipur reserves the right to accept or reject or cancel any or all enquiries or quotations at any stage without assigning any reason thereof.

19. The bid submission of last Date & Time- **17th Oct.,2024 by 02.00 PM**

20. All disputes are subject to Jaipur jurisdiction.

21. Must ensure to submit duly signed checklist (as per Annexure- D)

Deputy Registrar (S&P)

ANNEXURE- A

MANUFACTURERS' AUTHORIZATION FORM

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

Date: [insert date (as day, month and year) of Bid Submission]
Tender No.: [insert number from Invitation for Bids]

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

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

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

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

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

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

[insert date of signing]

ANNEXURE-B

DECLARATION OF LOCAL CONTENT

[For Local Content of Products, Services or Works]

(To be given on Company Letter Head – For tender value below Rs.10 Crores)

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

To,

The Registrar

MNIT Jaipur

Subject: Declaration of Local Content

Tender reference No._____

1. Country of Origin of Goods being offered:_____
2. With reference to Order No. P- 45021/2/2017-PP(BE-II) dated 16-09-2020 read with OM No. P-45021//102/2019-BE-II-Part(1) (E-50310) Dt. 04.03.2021 of DPIIT, Ministry of Commerce and Industry, Govt. of India, we fall under the following category of supplier (please tick the correct category) for the items for which this tender has been floated and being bided.

   - Class I local supplier – has local content equal to more than 50%. Local contents added at _____ (name of location).
   - Class II local supplier – has local content more than 20% but less than 50%. Local content s added at _____(name of location).
   - Non-local supplier – has local content less than or equal to 20%. Local contents added at _____ (name of location).

3. We are solely responsible for the above mentioned declaration in respect of category of supplier. False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which we may be debarred for up to 2 years as per Rule 151(iii) of the General Financial Rules along with such other actions as may be permissible under law.

Signature of Bidder/ Agent

Name:_____

Designation:_____

Organization Name: ____

Annexure – C

PERFORMANCE BANK GUARANTEE

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

BANK GUARANTEE NO. :

DATED :

Dear Sirs,

1. THIS DEED OF GUARANTEE made on this.....day of .....…….

   between**MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY, JAIPUR** (hereinafter called the "**MNIT"** which expression shall unless excluded by or repugnant to the context includes its successors and assignees) of the one part and the ..... (hereinafter called the **"Bank"** which expression shall unless excluded by or repugnant to the context include its successors and assignees) of the other part.

2. AND WHEREAS as per clause……..……. Of the purchase order in question the supplier shall furnish a Performance Bank Guarantee of 05% of P.O. Value i.e. Rs. …… (in words) …… only) valid for the period of two months beyond warranty period as and by way of security for satisfactory working of the ……. AND WHEREAS at the request of the supplier, the Bank executes these presents.

3.0 THIS DEED WITHNESSETH AND IT IS HEREBY AGREED AND DECLARED BY AND BETWEEN PARTIES HERETO AS FOLLOWS:

3.1 The Bank hereby guarantees to the MNIT, Jaipur that the equipment / service contracted are capable of performing the work as demanded by the MNIT, Jaipur**.** In the event of equipment / service failing to perform to the satisfaction of the MNIT, Jaipur, which shall be final and conclusive of the factum of non-performance, the Bank shall indemnify and keep the indemnified to the extent of ..... of P.O. Value i.e. Rs. ..... (Rupees ....) valid for the period of two months beyond the warranty period against any loss or damage that may be caused to or suffered by the MNIT, Jaipur consequent to non-performance of the contracted equipment / services to be supplied by the supplier.

3.2 In consideration of the aforesaid premise and at the request of the supplier, we the Bank hereby irrevocably and unconditionally guarantee that the supplier shall perform in an orderly manner their contractual obligations in accordance with the terms and conditions set forth in the Purchase order dated ..... and in the event of the supplier's failure to do so, the Bank unconditionally pay to the MNIT, Jaipur on demand, any amount up to the value mentioned in Clause 3.1 above without any reference to the supplier and without questioning the claim.

3.3 The guarantee herein shall remain in full force for a period of two months beyond the warranty period from the date of certification by the MNIT, Jaipur of successful installation and commissioning of the equipment/ service contracted. Date of start of warranty period will be notified by MNIT, Jaipur to the Bank.

3.4 The decision of the MNIT, Jaipur regarding the liability of the Bank under the guarantee and the amount payable there under shall be final and conclusive and binding on us without question. The Bank shall pay forthwith the amount demanded by the MNIT, Jaipur not withstanding any dispute, if any, between the MNIT, Jaipur and the supplier.

3.5 The Bank further agrees that the guarantee herein shall remain in full force during the pendency of aforesaid period mentioned in Clause 3.3 above and also any extension of the guarantee which has been provided by the Bank for this purpose beyond the aforesaid period provided, further, that if any claim accrues or against the Bank by virtue of this guarantee, should be lodged with us within a period of 60 days from the date of expiry of the guarantee period.

3.6 This Guarantee shall not be affected by any change in constitution of the supplier, MNIT, Jaipur or us not shall it be affected by any change in constitution or by any amalgamation or absorption or reconstruction thereof otherwise, but will ensure for and be available to and endorsable by the absorbing amalgamated company or concern.

3.7 The MNIT, Jaipur has the fullest liberty without affecting the guarantee to postpone at any time or from time any of the powers exercisable by it against the supplier, either to enforce or forbear the clause governing guarantee in the terms and conditions of the said contract and Bank shall not be released from its liabilities under the guarantee by any matter referred to or by reason of time being given to the supplier or any other forbearance, act or omission on the part of the MNIT, Jaipur or any material or things whatsoever which under the law relating to sureties shall but for the provisions hereof have the effect of so releasing the Bank from its liabilities.

3.8 We further agree that the MNIT, Jaipur shall have the fullest liberty without affecting in any way our obligations hereunder with or without our consent or knowledge to vary any of the terms and conditions of the said contract or to extend the time of delivery from time to time.

3.9 The Bank undertakes not to revoke this guarantee during its currency except with the previous consent in writing of the MNIT, Jaipur.

3.10 We further agree that in order to give full effect to the guarantee herein contained MNIT, Jaipur shall be entitled to act as if we were its principal debtors in respect of its claim against the Supplier hereby guaranteed by us as aforesaid and we hereby expressly waive all our rights of suretyship and other rights if any which are in any way inconsistent with the above provision of this Guarantee.

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

COUNTERSIGNED

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

Annexure – D

PRICE REASONABILITY CERTIFICATE

(to be submitted on firm's letterhead)

This is to certify that we have offered the maximum possible discount to you in our Quotation No. …….. Dated …….. for (Currency) ……..
We would like to certify that the quoted price are the minimum and we have not quoted the same item on lesser rates, than those being offered to MNIT Jaipur, to any other customer nor will do so till the validity of offer or execution of purchase order, whichever is later.

Signature ofTenderer

Name:_____

Designation:_____

Organization

Name: Contact

No.: _____

Annexure – E

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

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

S.No.	Document/Details sought for	Page No.	Yes	No
1	Detailed technical product catalogue.			
2	Bidder must be manufacturer/authorized distributor/dealers and they have to enclose a certificate of authorization of manufacturer in format at Annexure –A, (Authorization certificate in any other format will not be valid) OEM itself or any one authorized dealer on behalf of OEM a may participate in bid. OEM and its dealers both may not participate at the same time.			
3	A certificate from OEM to the effect that the said good /software is a proprietary item			
4	A certificate to the affect that the price quoted by you is the lowest and not more than the price quoted to other Educational Institutes in India.			
5	A certificate to the affect that your firm has not been Black Listed/De Listed or put to any Holiday by any Institutional Agency / Govt. Department / Public Sector Undertaking in the last three years.			
6	List of industrial and educational establishments where the items enquired have been supplied is to be provided along with previous Purchase orders.			
7	Declaration of Local Content			
8	Performance Bank Guarantee: 05% of the contract value valid till warranty period Plus 60 days.			
9	Warranty: 01 year which includes AMC contract for updation, upgradation, technical support and refresher training as required.			

Any other important point requested in the bid invitation letter

ANNEXURE-F

SPECIFICATIONS

Solution and Solvers

- Full Wave methods for geometrically complex problems (MoM, FEM)
- Time domain method FDTD
- Asymptotic methods for electrically large problems (MLFMM, PO, LE-PO, RL-GO, UTD)
- Characteristic Basic Functions (CBF) technique must be included in the MoM. Hybrid CBF-subdomain approach for single excitation problems should also be included.
- Hybridized Solvers, with true parallelization for shared and distributed memory environments (i.e. all processes contribute to the solution of the same problem), and not only splitting different frequency runs or similar. The tool should provide following full bi-directional hybridization:
  Hybrid FEM-MoM / Hybrid FEM-MLFMM / Hybrid MoM-GO /
  Hybrid MoM-UTD / Hybrid GTD-PO / Hybrid MoM-PO/ Hybrid MoM-LE-PO
- Dedicated solvers for wave propagation and radio network coverage analysis
- Unique characteristic mode analysis (CMA) solver to calculate modal currents, eigenvalues, modal significance, and characteristic angles.
- Advanced solver technologies like MoM with macro basis functions, PO/GO/PTD, GTD/PO, and MLFMM parallelized through MPI/OpenMP
- Ultrasound tool to compute parameters of systems that use ultrasound waves by applying the Geometrical Theory of Diffraction (GTD).
- Analysis and design of reflection and transmission coefficients in periodic structures and metamaterials.
- Doppler frequency shift analysis in electrically large and complex bodies for MOM / PO simulations.
- Higher Order Basis Functions (HOBF) and Adaptive Cross Approximation (ACA) wherein not only the actual solution phase is accelerated, but also the near- and far-field calculations for MLFMM.

Productivity Features:

- MLFMM for the efficient simulation of electrically large platforms and asymptotic solvers like RL-GO, PO and UTD for electrically very large platforms.
- Advanced material modelling including metals, thin dielectric sheets, coatings, composites and anisotropic layers, for example carbon fiber.
- Advanced RCS, shielding, RADHAZ, HIRF, EMP, and lightning analysis.
- Model decomposition - Replace complex sources and receivers by equivalent sources to efficiently solve large and complex platforms, and NGF method for the analysis of dynamic elements and antenna placement investigations.
- Co-site interference analysis electric and magnetic shielding.
- Advanced cable coupling modelling and simulation.
- CMA solver gives insight into the resonant behavior of the structure, offering a smart (non-brute-force) design approach for antenna design and placement.
- Integrated Lua scripting environment for data manipulation and task automation.
- Dedicated toolset for array design. Perfect boundary condition (PBC) for periodic and domain Green’s function method (DGFM) for large finite arrays.

Computational Features

- Advanced adaptive frequency interpolation scheme for the efficient calculation of broadband responses.
- Aperture modelling with planar media
- The capability to model slots in infinite metal surfaces in between dielectric layers.
- Multilayer planar Green's function for modelling of real earth or dielectric substrates.
- Various options to model dielectric bodies (volume / surface meshes, approximations for earth, thin sheets, coated wires).
- Frequency dependent material parameter specification: Debye, Cole-Cole, etc.
- Different options to model dielectric bodies to make this efficient for the problem at hand (SEP / VEP / FEM / coatings / thin dielectric sheets).
- Perfect magnetic conductor (PMC) boundary conditions (in addition to open and perfect electric conductor (PEC) boundaries).
- Combination of MoM-SEP and Planar Green's Function Methods to allow users to model dielectric objects that are buried in 2D infinite stratified dielectric media or to model finite sized objects with complex planar dielectric structures.
- Full wave formulations to model currents on metallic surfaces, which enable accurate simulations of coupling, near fields, far fields, radiation patterns, current distributions, impedances, S-parameters, etc.
- Periodic boundary conditions and planar multi-layered substrates to characterize the radome material.
- Thin dielectric sheet (TDS) approximation technique to analyse radomes constructed with multiple thin dielectric layers.
- Simulations involving anisotropic multi-layer carbon-fiber-reinforced composite materials.
- SPICE circuit integration

Solver Performance Features

- The FEKO solver is fully parallelized, and optimized to exploit multi-CPU distributed memory resources
- GPU-based solver acceleration
- Optimized out-of-core solver to deliver solutions when RAM limits are reached

User Interface

- State-of-the-art 3D Parasolid CAD modelling interface, including import/export of CAD and mesh formats
- Integrated mesh engine for generating triangle, tetrahedron and voxel simulation meshes
- Comprehensive post-processing including 1D, 2D 3D plots, import of measurement results, report generation, etc.
- Full Lua script automation for modeling, configuration and post-processing, with macro recording support

Specialized Solutions

- Bi direction coupling with complex cable bundles and along arbitrary cable paths
- Special solver for efficient analysis of antennas integrated into layered windscreens
- Efficient methods for finite and infinite arrays and periodic structures
- Metamaterials and composites

GUI Features

FEKO offers a graphical user interface (GUI) with easy workflow, running on Windows or Linux. The GUI can be used every step of the way, from model creation in CADFEKO through to visualization of results in POSTFEKO.
The scripting editor may be used for to automate model setup or for advanced post-processing of results.

GUI

A GUI with easy workflow, running on Windows or Linux. The GUI has three components: CADFEKO, EDITFEKO and POSTFEKO.

- **CADFEKO** is used for geometry modelling, mesh generation, and solution setup. It has comprehensive, parametric modeling features. CAD models and meshes can be imported from and exported to several standard formats.
- **POSTFEKO** is used for the visualization of results (both 2D and 3D) and offers advanced post-processing feature (e.g. scripting and animations)
- **EDITFEKO** is aimed at advanced users, offering a scripting interface to the FEKO solver. Various programming features are supported.

Functionality:

- Interactive geometry specification.
- Excitation and port definition.
- Output requirement specification.
- Optimization setup.
- Automated or custom meshing.
- Solution control.

Features:

- Create parametric models with variables and mathematical expressions which may be modified to change the geometry, meshing and/or material parameters (e.g. dielectric constant, coating, conductivity).
- Create canonical structures (cylinders, polygons, spheres, cones, etc.) with the click of a button.
- Perform Boolean operations on geometry objects (e.g. split, union, intersect and subtract).
- Define various types of curves and surfaces, including analytical curves, splines and NURBS surfaces.
- Import externally computed lists of points for creation of lines, polygons, etc.
- Create geometry by spinning, sweeping and lofting lines and curves.
- Translate, rotate, scale, mirror and align objects.
- Project points, curves and surfaces onto surfaces or solids.
- Create surface meshes (triangles) or volume meshes (tetrahedral) with specifiable mesh density for any specific region of the geometry. Mesh features include:
    - Variable mesh densities in a single model to accurately and efficiently model small features
    - Mesh density specifiable on faces and edges, and mesh fixing tools
- Import and export filters for complex geometry or mesh models in industry standard formats.

CAD formats

- Parasolid
- AutoCAD DXF
- IGES
- STEP
- Pro/ENGINEER®
- Unigraphics / NX
- CATIA V4
- CATIA V5
- Gerber
- 3Di
- ODB++
- ACIS SAT

Mesh formats

- FEKO mesh
- FEMAP neutral
- NASTRAN
- meshed AUTOCAD DXF
- STL mesh
- PATRAN mesh
- Ansys CDB file mesh
- Concept mesh
- ABAQUS mesh
- Gerber
- GiD
- NEC

- Request multiple solution configurations, and set the following globally or per configuration:
    - Solution parameters (e.g. frequency, loads).
    - Excitations:
        - Voltage or current source at a port
        - Port definitions at wires, edges, waveguide aperture or stripline
        - Plane wave
        - Magnetic point source
        - Electric point source
        - Point source with specified radiation pattern
        - Impressed line currents
        - Near field aperture
        - Spherical modes
    - Calculation parameters (e.g. far-fields, near-fields, S-parameters, SAR analysis).

- View and add components to network and cable schematics.
- Tree based access to simulation elements (settings, materials, grids, results, etc.)
- Ribbon based menus designed in support of the standard workflow
- Quick launch toolbars to access global functionalities
- Search bar for easy location and execution of functions and access to help
- Selection, zooming, 3D mouse-only based handling, etc.
- Full solver control via GUI

Post-processing with POSTFEKO

Functionality:

- Model validation.
- Post-processing and visualization of results.

Features:

- Support for multiple 2D and 3D views with multiple geometry (*.fek) and result (*.bof) files in a single session.
- Radiation pattern (3D in model, 2D XY/polar)
- Radiation and far field data, radar cross section (RCS), etc.

- Full multiport S-parameter extraction
- Several visualisation options for surfaces, incl. isosurfaces, 2D field cuts
- Multiple results displayable in same viewport for comparison
- Support for multiple results of the same type, e.g. displaying more than one near-field ortho-slice in the same 3D view.
- 2D results can be displayed in various formats on Cartesian graphs, polar plots and Smith charts.
- 3D views can be set up to display geometry, meshes, currents, near-fields and/or far-fields.
- 2D graph measurements and annotations for values such as local and global maxima and minima, beamwidth, bandwidth and side lobe levels.
- Multiple and arbitrarily oriented cutplanes with selectable cut entities are supported for 3D views.
- Graph and data import and export (e.g. import of measurements for comparison purposes).
- Advanced Specific Absorption Rate (SAR) display options (IEEE standard compliant whole body average, 10g cube localised, 1g cube localised)
- UTD ray colours indicate their relative amplitudes.
- Electrical surface currents and electrical charge density display options.
- Characteristic mode currents, fields, eigenvalues, modal significance and characteristic angle display options.
- Scripting based advanced post-processing as well as automation with the Lua POSTFEKO API.
- Export of images and animations to popular file formats.
- Automatic report generation via simple or template based mechanisms to MS PowerPoint, MS Word or PDF file formats.
- Visualization of optimization results.
- Support for time domain results processing.

Optimization

- Automated optimization of multi-variable and multi-goal problems with several algorithms, including GA and particle swarm
- Real-time monitoring of the optimization process

Specialized Solutions

- Bi-direction coupling with complex cable bundles and along arbitrary cable paths
- Special solver for efficient analysis of antennas integrated into layered windscreens
- Efficient methods for finite and infinite arrays and periodic structures
- Metamaterials and composites

Model and Domain Decomposition

- Decomposition of some EM problems to reduce computational cost
    - Options for Domain Decomposition with the Numerical Green's Function (static / dynamic domain) A feature wherein a fixed structure can be modelled and the static part of the solution saved, avoiding unnecessary repetition of the same calculations in further simulations involving the structure.
- Numerically efficient equivalent sources for complex sources and receivers

Non-Radiating Networks

- Lumped, linear circuit models can be included in a simulation, often used for matching networks
- S-, Z- or Y-parameter files or SPICE circuit file Network definitions

Interfaces

- CAD and mesh import/export of most major formats, Gerber, ODB++ and 3di
- Other HyperWorks products including HyperStudy, HyperMesh

HPC Facility with FEKO

Computationally expensive problems exist where high performance computing (HPC) is essential. Numerous HPC solutions are available with FEKO

- Computation acceleration via graphics processing units (GPUs)
- Parallelisation of calculations using central processing unit (CPU) technology via multi-threading, Message Passing Interface (MPI) and Open Multi-Processing (OpenMP) parallelisation
- Optimal resource use via specialised coding techniques

Radio Network and Radar Coverage Features

- A variety of propagation models to give complete coverage of all of the radio spectrum.
- Frequency assignments with automatic methods, ensuring compatibility with the authorized frequency utilization, band plans and maximum spectrum utilization
- The tool provides geographic data conversion and re-projection. It must support different formats for ground height data, building heights, clutter/terrain classifications, map and satellite images and cartographic data in vector format.
- The tool iscapable of selection of strategies to control the selection of frequencies across the available band or discrete frequencies.
- The tool calculate compatibility between sound broadcasting stations in the band 87 – 108
- The tool calculates coverage with or without jamming, displaying probability of detection (Pd) for a given radar cross section and the detectable radar target for a fixed Pd.
- The tool calculates the link budget, fading margins and outage probabilities for radio links.
- The tool performs calculations of interference situations in sites (locations) with many transmitters and receivers.
- The spectral widening of intermodulation, spurious and harmonic signals should be considered. Individual transmitter duty cycle should be included and the probability in time for each potentially interfering signal should be calculated.
- The tool provides capabilities to plan fixed and mobile radio sites, links and networks for coverage, self-interference and frequency assignment in order to fulfil the communication objectives.
- Radar coverage and line-of-sight coverage for optical sensor systems can also be calculated, as well as satellite coverage and interference.
- The impact of jamming on the radio communication coverage and radar coverage can be analyzed, both for own and hostile jammers. The coverage for radio sensors such as direction finders and surveillance receivers can be calculated.