Improvements for Ver 23.30 **August 1, 2026**

- Add more data input checking features.
- Improve some graphics.
- Add **Import** features under **Project** menu to import ARMD *.ROI and *.TOI files.
- Convert all the Help .hlp files to .chm and PDF files. Add more Help buttons and documents in the Document folder.
- Re-organize the program folders.
  \Document – Contains many useful documents and manuals.
  \Example – Contains more than 550 examples.
  \LicenseRelated – Contains most common License related questions and answers.

  There are many examples stored in the Example folder. Some are self explanatory, some are taken from previous publications (books, papers. reports) to verify the program accuracy, some are taken from industrial applications, such as compressors, expanders, turbochargers, turbines, generators, blowers, fans, pumps, aircraft engine, motors, etc. and they are employed to demonstrate the program capabilities.

  Examples are organized according to the first 2-4 letters of the file names:
  1) Ch_1 to Ch_9 are correspondent to the Chapters 1-9 of the Reference 1. For example, Ch_6 are bearing related examples, Ch_8 are torsional vibration related examples, and Ch_9 are balancing related examples.
  2) Ch_A to Ch_H are correspondent to the Chapters 1-8 of the Reference 2. For example, Ch_C are hydrodynamic bearing related examples, Ch_D are hydrostatic and hybrid bearing examples , Ch_H are Lateral-Torsional-Axial Coupled vibration examples.
  3) PP_ examples are taken from previous publications.
  4) V19-23 examples are used to demonstrate some features presented in the Version 19-23. They are explained in the documents started with V19-23 in the Document folder. Please read through these documents.
  5) Others are easy to identify, such as ThrustBrg for thrust bearings, Laby_Seal for Labyseals, ..etc.

References:

1. "Introduction to Dynamics of Rotor-Bearing Systems"
2. "Practical Rotordynamics and Fluid Film Bearing Design"

Improvements for Ver 23.20 **April 1, 2026**

- Rotor – Increase the digits of precision in the output RMB matrices.
- Rotor – Increase the number of Load Torques from 6 to 10
- Rotor – Increase the number of linear bearing coefficients for bearing Type 1 (Speed Dependent Bearings) from 31 to 101
- Rotor – Increase the number of Rotors from 25 to 50
- Rotor – Add more model checking features

Improvements for Ver 23.10 July 1, 2025

- Rotor – Improve Torsional Analysis and Graphics with Reciprocating Excitations. See **Torsional Analysis - Additional Info.pdf**
- Rotor – Tools – Improve Equivalent Torsional Stiffness calculation.
- BePerf – Improve the graphics for the Non-Dimensional Analysis.

Improvements for Ver 23.00 January 1, 2025

- Add option to open "chm" help file under MENU Help
  The .chm files are also the manual files, double click can also open it.
- Rotor – Add option to display certain section of the Mode Shapes. Mainly used for the multiple shafts systems to display certain rotor motion.
- BePerf – Add Supply Oil Flow for the fixed-lobe bearings. Note: 0 is the default value which indicates the side leakage will be used in the heat balance calculation.
- Rotor – Add an add-on module to import the data from pdf file.

Improvements for Ver 22.01 September 1, 2023

- Rotor – Add mode shapes in the Critical Speed Map Analysis
- BePerf – Add more numerical digits in the tabulated outputs
- BePerf – Improve calculation accuracy for tilting pad bearings with extremely small L/D ratio.

Improvements for Ver 22.00 March 1, 2023

- Rotor – Increased the memory stack size, so the users can run with larger models..

Improvements for Ver 21.31 November 8, 2022

- Rotor – Fixed an issue in plotting the Bearing Transmitted Forces in the Steady State Synchronous Response Analysis.
- Rotor – Fix the format using Import *.xls file
- Rotor Compiler Optimization Settings – Use Default instead of Max Speed

Improvements for Ver 21.30 May 12, 2022

- Rotor – Fixed a bug in plotting the Foundation Coordinate Response in the Steady State Synchronous Response Analysis.

Improvements for Ver 21.20 August 1, 2021

- Rotor – Replaced the simplified asymmetric rotor analysis in Ver 21.10 with more general finite element approach. The option for the simplified model will be removed in the next release V22 in the future.
  See **V21_Asymmetric_Rotor_Examples_Part2.pdf**

Improvements for Ver 21.10 **February 20, 2021**

- Rotor PostProcessor – Add option to plot the normalized modal stress (0-1). Default is the normalized plot now. To obtain the non-normalized plot as before, go to Options – Settings and uncheck the Normalized Stress
- Rotor – Add Asymmetric Rotor Analysis.
  See **V21_Asymmetric_Rotor_Examples_Part1.pdf**

Improvements for Ver 21.00 **February 1, 2020**

- Rotor – Add Base Motion Analysis
  See **V21_BaseMotion.pdf**
- Rotor – Fix an input inconsistency for Bearing Type 15 (TPJ) caused in Ver 20.20 by BePerf improvement.

Improvements for Ver 20.30 **October 1, 2018**

- BePerf - Add Turbulence effect for the tilting pad bearing
- Rotor – Fix an input bug for the Bearing Type 10 – General NonLinear Bearing
- Rotor - Add Element Torque Table for Torsional Startup Transient Analysis requested by Solar Turbine

Improvements for Ver 20.21 **July 1, 2018**

- Add Element Torque Table for Torsional Short Circuit Transient Analysis requested by Solar Turbine
- Add more digits text output in the transient analysis for Curtiss-Wright

Improvements for Ver 20.20 **April 7, 2018**

- Improve numerical integration stability for the Transient Analysis
- Add cut-off low frequency to eliminate the low frequency noise in the transient analysis due to initial conditions and constant loading
- Improve the BePerf – Tilting Pad Bearing Advanced Feature option
- Enhance some Postprocessor Graphics

Improvements for Ver 20.10 **March 1, 2018**

- Add Analysis Type 13 – Morton Effect
- Add Analysis Type 14 – Multiple Analyses for the same rotor file
- Enhance PostProcessor Graphics in the Time Transient Analysis – Frequency Domain

Improvements for Ver 20.00 **November 23, 2017**

- Add new features in BePerf for fixed-lobe and tilting pad journal bearing design: 1) Parametric study 2) Design Comparison. **See Ver_20_ReleaseNotes.pdf.**
- Add option to add/modify more lubricants into the oil library. Note that the first 33 lubricants cannot be changed. But users can add more lubricants into the library. **See Ver_20_ReleaseNotes.pdf.**
- ThrustBrg: to be consistent with BePerf, the Case number in ThrustBrg starts from 1 instead of 0.
- ThrustBrg: Fixed a bug in the pressure plot color legend, also add numeric scale on the legend.
- In Rotor, add capability for the rotating bearings (mainly for turbochargers, see example Ch_6_FRB_4DOF_Non-Circular_Inner_Film.rot), or rocking bearings (for ship applications, see example V20_sund_ship.rot and Ship_Rocking_Animation….gif animation files).
- Transient Analysis in Frequency domain, the initial condition for the high speed point uses the final condition from the previous speed point.
- In the Transient Analysis, the integration time and time step are important for the FFT plot, therefore, add "Suggested Time Step" feature for the integration time and time step. In some highly non-linear cases, if the suggested time step could not converge, then use smaller time step. Try new time step = old time step / 2.
- Add velocity and acceleration in the FFT displays.
- Improve Whirl Speed and Stability Maps – Magenta color for the forward modes, Green color for the Backward modes, Blue color for the mixed modes. Also add the option to plot the forward and mixed (if exists) modes only. Since the forward modes in most cases are the concerns, not the backward modes.
- Add damping factor vs. frequency ratio (API 610) in the PostProcessor for the Whirl Speed and Stability Analysis.
- Add Bearing Type 15 in Rotor. This option allows the Rotor and BePerf be fully integrated. This is for the linear analysis only. For Non-Linear analysis, use Type 13. Using Type 15, the unit system between rotor file (rot) and bearing file (LDI, or TDI) can be different, although consistent unit system is recommended. But they can be different.
- In Rotor Program, any files associated with the ROT file, such as the bearing files, foundation file, and torsional excitation torque files, if they have the same path name with the rot file (i.e., they are located in the same folder with rot file), the path name will be removed for simplicity and easy portability. The Rotor program will also double check the existence of these associated files. If they are not found under their specified path, then the rot path name will be used for another try.
- Add new analysis types 12, 15, 16, 17, 18, 19, and 20.
- Add Design Comparison in Rotor – Compare different designs.
  1. Compare two different (.rot) files
  2. Same rot file, but different bearing files
  3. Same rot and bearing files, but different bearing variables
- For more information and examples, **See Ver_20_ReleaseNotes.pdf.**

Improvements for Ver 19.02 **May 9, 2017**

- Improve the Text Output Format (*.OU2 and *.OU4).
- Correct some spelling errors.
- Fix a bug existed in Ver 19.01 in the heat balance calculation for the Fixed Lobe Bearing Type with Advanced Features ON.
- Fix a graphic error in the torsional mode shape plot when Rigid Link in the Shaft Elements tab is checked to connect two shafts.
- Batch mode examples for verifications and future expansion – see BatchRunRotor.bat, BatchBePerfTpj.bat, BatchRunLobeDNF.bat, BatchRunReynolds.bat, and BatchRunExample.bat

Improvements for Ver 19.01 **January 7, 2017**

- Use the latest Safenet (Software Protection Software) drivers.

Improvements for Ver 19.00 **January 1, 2017**

- Allows dot (".") and white space (" ") in the file and path name.
- Speed dependent bearing coefficients can be either spline interpolation or linear interpolation in the Rotor program. Spline function was used before Ver 19. The Bearing coefficients after the interpolation are printed in the text output file.
- Critical Speed Analysis – for speed dependent bearing coefficients, the stiffness at the last speed point was used. Now, the speed point can be specified. If not specified (i.e., zero value), then the last speed point is used as before. The damping effect can also be included if the bearing dynamic stiffness is desired. If the specified rotor speed is close to the critical speed, the result and mode shape will be more accurate.
- Add more model checking features to avoid any mistakes in building the rotor model. An element L/D checking feature can be pre-specified in the Preference Settings – Model Display Settings.
- Model Flipping (Reversing) – allows to flip the rotor model (left to right)
- Models Combining (Merging or Appending) – allows to combine tow model files into a single file. This allows users to build the complicated model with multiple rotors one rotor at a time.
- Fixed the Rotor Rigid Link feature for the torsional and axial analysis. It was initially designed for the lateral vibration only.
- Whenever possible, the formats for the number printout on the plots can be specified under Option – Settings, or pre-defined in the Preference Settings – Post Processor Graphic Settings. Also, the color for the text printout on the plots can be associated with the curve color.
- Add more graphs in program – RotorBal – Tools.
- Add minimize and maximize screen options for the main menu in RotorBal and GearLoad.

- Add leakage calculation for carbon ring seals – Rotor – Tools – Estimate Carbon Ring Seal Leakage.
- Add calculation for the maximum allowable residual unbalance per API and ISO specifications.

For more details on these enhancements, see pdf document – "Ver 19_Examples.pdf".

Improvements for Ver 18.30 October 1, 2016

- Add Steady State Harmonic Response Analysis for Coupled Lateral-Torsional-Axial Vibration.
- Add descriptions for the probes and Speeds in the Rotor Balancing Program.
- Add LabySeal option in the new Main Menu
- Rewrite the Print to File for the figures and Animation files

Improvements for Ver 18.20 January 1, 2016

- Add water properties into the lubricant library for bearing programs BePerf and ThrustBrg.
- Add hydrostatic thrust bearing into ThrustBrg.
- Add circular pad thrust bearing into ThrustBrg.
- Add summary results in the graphic output into ThrustBrg.
- For Floating Ring Bearing in Heat Balance Calculation, allow different Inlet Temperatures and Heat Carry Away Factors for the inner and outer films.
- Increase Stack Size for large rotor models.
- Add Herrinbone Gears (double - helix) and many other options in GearLoad.

Improvements for Ver 18.10 July 1, 2015

- Allows for different single pad properties, such as preload, offset, arc length, and pivot location for each pad in tilting pad bearings.
- Add inputs & outputs summary in thrust bearing graphic outputs.
- Fixed bug in thrust bearing graphics for multiple runs
- Add Reset button in the critical speed map plot to enter the bearing stiffness manually
- Add more general motor driving torque for the torsional startup analysis
  $T_d = T_{rated}\left[T_{avg} + T_1 \sin\left(\omega_1 t + \phi_1\right) + T_2 \sin\left(\omega_2 t + \phi_2\right)\right]$

Improvements for Ver 18.00 November 15, 2014

- Add Thrust Bearing and Spiral Face Seal modules
- Add more features for the Floating Ring Bearing in both Rotor & BePerf
- Improve computational efficiency, including x64

Improvements for Ver 17.10 July 15, 2014

- Add engine misfire feature for the torsional reciprocating steady state response
- Add initial conditions (theta, theta dot) for the torsional time transient analysis

Improvements for Ver 17.00 May 15, 2014

- Add Lateral-Torsional-Axial coupled vibration through gear meshes and thrust collars (Rider Rings).
- Add Catenary Curve Analysis using optimization technique.
- Allows for the next shaft starting station number equal to the previous shaft last station number, if they have the same speed. Like rigid link between two shafts.
- Improve computational efficiency
- Add direction of rotation in the graph
- Bearing can be plotted like inter-shaft bearing with a rectangle if Brglength = -1
- Many Rotor & Beperf graphics improvements.
- Improve the GearLoad program, more options and more graphics
- Improve the tilting pad bearing calculation when the eccentricity ratio is very high

Improvements for Ver 16.20 January 15, 2013

- Add torsional damped natural frequency interference diagram.
- Improve torsional time transient analysis postprocessor graphic speed
- Add hole split in the balancing program

Improvements for Ver 16.10 October 20, 2012

- Add reciprocating torsional excitation.
- Add curve fitting selection in the torsional driving torque input
- Add more checking features in the data input

Improvements for Ver 16.00 July 1, 2012

- Add engine torsional excitation.
- Add hydrostatic-hybrid bearing analysis.
- Add axial stiffness for the thrust bearing analysis.
- Add speed dependent viscosities and speed ratios for the floating ring bearing.
- Add weighting factors for probes and speeds in the balancing calculation.
- Add PNG, JPEG, GIF, BMP graphic formats.

Improvements for Ver 15.10 September 3, 2011

- Add more numerical integration methods and control parameters.
- Add Phase Data for the bearing/support force.

- Add bearing/seal mass coefficients in bearing type 1 (speed dependent bearing) and 2 (bearing from data file).
- Add Frequency Dependent Damping (Dynamic Magnifier) in the torsional analysis.
- Add backlash in the torsional non-linear connection/coupling.