XLROTOR Release Notes

March 20, 2024, Version 6.1

- New feature for generation of CAD-like 3D output of model geometry and mode shapes. Including animation of mode shapes. Search for File Export in the online Help.
- Improvements to some of the bearing and seal analysis tools to increase calculation speed.
- Improvements to license management tools.
- Various other minor enhancements and fixes.

March 19, 2023, Version 5.9

- Addresses issues with recent updates to Office 365.
- Critical bug fix in XLHydrodyn. The bug affected only tilting pad bearings with nonzero pivot tilt stiffness.
- Bug fix in XLJrnl. Tabulated data for pressure dam bearing was not fully accurate.
- Bug fix which prevented running an API Level 1 analysis for a rotor with transfer functions.
- Bug fix for incorrect output of absolute rotational displacements for an XLCoupled transient analysis.
- Several other fixes affecting XLCoupled analysis.
- XLHoneycomb has been updated to handle choked flow.
- New feature to enable easier analysis of bowed rotors. Search for "bowed rotors" in the online help.
- New feature to perform XLTorsional <u>eigenvalue</u> analysis for a range of speeds with model elements varying with speed. See XLTorsion Worksheet in the online help.
- New feature to perform XLTorsional <u>response</u> analysis for a range of speeds with model elements varying with speed. See XLTorsion Worksheet in the online help.
- New feature to cross hatch the model geometry for beam elements detected to overlap.
- Mode shape output now includes Modal Mass, which enables rescaling the mode shape to be mass-normalized.
- Improvements to transient integration analysis.
  - XLHydrodyn can now be used as a bearing force calculation routine for nonlinear transient analysis.
  - Nonlinear transient analysis can now utilize *array formulas*. This enables more efficient calculation of nonlinear forces, and thereby faster run times.

- Updates to Dyrobes model importer.
- Improvements to license management tools.
- Numerous other minor enhancements and fixes.

June 3, 2021, Version 5.83

- Fix for an incompatibility in 64-bit Excel 365 introduced by a recent Microsoft Office update.
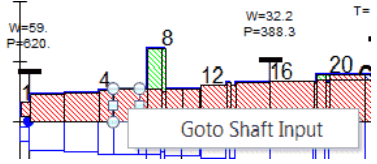- Other minor fixes.

May 7, 2021, Version 5.82

- Mode shape overlays for Undamped Critical Speeds can now display a color map of strain energy. Refer to the *Overlay Geometry on Mode Shape* command in the online help.
- XLRotor now works with files opened from network drives and cloud locations such as OneDrive.
- In XLHydrodyn, the circumferential profile plot now displays Sump and Shaft temperatures.
- Other minor bug fixes and enhancements.

January 23, 2021, Version 5.80

- More performance and compatibility improvements with Microsoft Excel versions 2013/365/2016/2019.
- Fixes to MIMO Transfer Function modeling.
- XLHydrodyn now offers the options of contour and color map plots of film pressure and temperature.
- A new program named XLThrustBearing for analysis of fixed and tilting pad hydrodynamic thrust bearings is now available as an extra cost option. Search for XLThrustBearing in the online Help.
- A new command added to copy a model to a new template. Search for **Copy To Template** in the online help.
- Improvements to various tools used to manage licenses.
- Numerous other minor enhancements and bug fixes.

April 14, 2020, Version 5.70

- More performance improvements with Microsoft Excel versions 2013/365/2016. In some cases transient analysis is several times faster.
- Workarounds for stubborn copy/paste problems with Excel charts and Windows 10.
- Support for MIMO magnetic bearings. Search for MIMO in the online help.

- Entities such as bearing supports and squeeze film dampers often required addition of GUIDED constraints. These are no longer required.
- When performing eigenvalue or linear response analyses, a complete copy of all model and analysis inputs are copied to the output worksheet below the analysis results. In addition to completely documenting the state of the model, subsequent mode shape calculations are done using this copy.
- When the Geo Plot has been cross hatched with material property boxes, clicking on a box displays a popup menu with a command to jump to the Shaft Input sheet at the row of the selected beam.

- The Geo Plot can be cross hatched for just part of the model by first selecting a range of cells in the Station # column on the Shaft Input sheet.
- Curve fitting of transfer function data to determine polynomial coefficients is now done with extended precision. Thirty digits is the default instead of the standard 15 digits of double precision arithmetic.
- Fixes to the Dyrobes importer.
- Other minor enhancements.

February 17, 2019, Version 5.60

- Numerous changes to improve calculation performance with Microsoft Excel versions 2013/365/2016.
- The chart cursor tool now works with Excel 2013/365/2016.
- The XLHydrodyn bearing code should run many cases faster.
- The Geo Plot can be overlaid on multiple mode shapes in a single operation by first selecting multiple mode shape charts. This not a new feature. What is new is that holding down the shift key when the button is clicked will have all mode shapes plotted together in a single chart with the Geo Plot.
- An API Response analysis is now able to output shear & bending moment diagrams when generating an ODS plot.
- The use of the .xlsm extension for XLRotor files used to be discouraged because of an Excel bug with that particular format. XLRotor now contains a workaround for that bug, so files with that extension should work without trouble.
- Bug fix. Operating deflected shapes could contain incorrect output at degrees of freedom constrained to ground.

- Bug fix. Output of ODS clearance violations in an API Response analysis was not correctly accounting for a Relative Station if one was input on the API Response sheet.

August 16, 2018, Version 5.53

- Improvements to Gnuplot implementation for 3D charts.
- Animation command can now make an animation file for a single chart or a region of a worksheet. See Animation in the online Help.
- New way to specify custom labels for the Geo Plot. Search for GeoPlot Labels in the online Help.
- New option to specify a maximum damping factor for output of damped roots. See Options/Eigenanalysis in the online Help.
- Workaround for a bug in Excel's VBA compiler that can cause Excel to crash.
- Bug fix. Maneuver Loads calculation always printed zero for all bearing reaction forces and moments.
- Many other minor bug fixes and feature enhancements.

March 30, 2018, Version 5.52

- Bug fix. This bug affected only analysis with Transfer Functions connecting a rotor to a housing. The transfer function was being connected to ground instead of the housing.
- Version 5.50 used new model checking logic that would flag certain types of bearing connections as modeling errors. Version 5.52 returns to the logic formerly used. The only effect of this change is to eliminate error messages 5.50 would display with certain models.
- Improved error handling with the XLRotor ribbon tab. Bugs in some installations of Excel would prevent XLRotor from running when buttons were clicked in the XLRotor ribbon. This change should work around that problem.

March 11, 2018, Version 5.51

- Bug fix. This bug affected only version 5.50, and only torsional analysis with the lumped mass option. Does not affect analysis done with the consistent mass option.
- Bug fix. This bug affected only version 5.50, and only torsional analysis done with nonzero inputs for Relative Damping or Absolute Damping on the Shaft Input sheet.

- Version 5.50 was shipped with a slow running version of the XLHydrodyn program for fluid film bearings. Version 5.51 will execute several times faster than 5.50.
- Other minor bug fixes.

January 23, 2018, Version 5.5

- Analysis of coupled Lateral & Torsional vibration. This is an all new analysis type, and is more advanced than conventional lateral and torsional analyses. See Coupled Analysis in the online help.
- 3D Display of mode shapes now has the option of displaying in either Psuedo3D or True3D. True3D mode shapes are displayed using open source Gnuplot graphics software that enables rotating the 3D plot with the mouse. See XLRotor/Options/Eigenanalysis in the online help. In addition, when the True3D option is turned on, 3D deflected shape plots are made with Gnuplot.
- XLHydrodyn output now makes 3D plots of pressure and temperature distributions using Gnuplot.
- The XLTransferFunction worksheet now allows input of cross coupled transfer functions.
- New option for cross hatching the Geo Plot with axial tension. Search for crosshatch in the online help.
- For torsional models, mode shape output now includes strain and kinetic energy distributions. See Roots Tors Worksheet in the online help.
- Updated the Dyrobes importer.
- All new installer. XLRotor can now be installed with or without administrator rights, and the XLRotor ribbon tab in Excel will always be visible.
- Improved compatability with Excel 2013, 365 and 2016. Mainly adding workarounds for bugs in these Excel versions.
- Assorted bug fixes and minor enhancements.

November 18, 2016, Version 5.12

- New features for torsional analysis of reciprocating machines. See the new Part 5 of the XLRotor Tutorial.
- The FFT tool can now be used on time waveforms generated from a torsional forced response analysis.
- Resolution of an Excel bug which can cause Excel to crash unexpectedly. This bug affected XLRotor version 5.10.
- Numerous other minor enhancements and bug fixes.

July 6, 2016, Version 5.10

- Installation for either 32 bit or 64 bit Excel is now fully automated.
- Improved compatibility with Office 2013 and 2016. However, Office 2010 will run XLRotor faster than the newer versions.
- The XLRotor user interface can now be displayed in either English or Chinese languages. See the XLRotor/Options/Other dialog box.
- Important bug fix to sorting of eigenvalues on a Roots Damped worksheet.
- Numerous other bug fixes and enhancements which make XLRotor more stable and run faster.

April 4, 2016, Version 5.0

- Two new commands have been added to the Modeling menu; 1) to merge multiple stations into one, and 2) to move a station to the left or right a specified amount. Look for Modeling Menu in the online help.
- XLRotor can now be used with 64 bit Excel. However, the version for 32 bit Excel is still the default. Contact support@xlrotor.com if you need the 64 bit version.
- An entirely new type of analysis has been added called Singular Value Decomposition (SVD). This is a relatively new development in the field of rotordynamics which greatly streamlines the assessment of synchronous response for complex rotor systems. It can also compute modal unbalance vector distributions from measured influence coefficient data. A new collection of detailed example models demonstrate its use. Look for SVD in the online help.
- Two new seal analysis modules have been added. XLAnnularSeal complements the XLShSeal module for pump seals by adding support for arbitrarily long seals and bushings. XLHoneycomb is for centrifugal compressors with honeycomb or hole pattern seals. Look for xlannularseal or xlhoneycomb in the online help.
- The API Level2 and API Response sheets can now be used in torsional analysis files.
- A new shaft modeling feature has been added to enable accounting for axial tension (or compression) in rotor sections. Look for "axial tension" in the online help.
- On the Imb's worksheet, excitation forces which are applied just in the x or y directions can now be input. Look for Imb's Worksheet in the online help.

- When generating an orbit plot from a Bode plot on a Resp worksheet, the orbit plot will now always use 0-pk units instead of using the same units as the Bode plot.
- The command Make Summary Worksheet can now be used to automatically process multiple charts on multiple worksheets in a single operation. This is a huge timesaver. Look for XLRotor Tools Toolbar in the online help.
- In torsional analysis files on the Orders worksheet, the inputs in the Applied Torque Orders|Amount column can now be completely arbitrary functions of rpm. Look for the Orders Worksheet in the online help for details.
- For torsional analysis, excitation torques defined on the Orders worksheet are now applied during a transient analysis. Look for the Orders Worksheet in the online help for details.
- Torsional shear stress can now be output for linear response runs and also for transient response runs.
- For torsional models, a linear response analysis done for zero order torques (i.e. static torques), is now done with a special procedure. The static acceleration caused by the net static torque is determined, and used to evaluate inertial acceleration torques. The resulting components of static twist, torque and stress are included in all outputs.
- For transient analysis, the format of the Transient Worksheet has been simplified, and now has fewer input tables. Look for Transient Worksheet in the online help.
- For transient analysis with lateral models, imbalances defined on the Imb's worksheet are now permitted when the rotor speed is variable. Look for Transient Worksheet in the online help.
- Phase angle inputs for imbalances on the Imb's worksheet and for torque excitations on the Order's worksheet, are now <u>lagging</u> phase angles. This was done to be consistent with lagging phase angle outputs for response runs. Look for Phase Angle Conventions in the online help.
- In Geometry Plots for torsional models, the automatically determined positions of each model level can now be overridden with manually entered values. Look for Torsional Stations Worksheet in the online help.
- Fixed bug with torsional deflected shapes when time waveform analysis option is turned on. The bug would cause torsional ODS results to get bigger each time the analysis was run. This bug was in versions 3.92 to 4.01.

- Fixed bug with output of Shear & Bending Moment diagrams for ODS analyses done with the FE solver. Results were too high by a factor equal to shaft speed in rad/sec. This bug does not affect S&BM diagrams produced with the TM solver, nor does it affect static deflection analysis S&BM diagrams.
- Bug fix involving unit conversions with bearing worksheets. Starting with version 3.942, if an XLUserKC sheet included moment coefficients, <u>and</u> the rotor model and XLUserKC sheet were in different units, an incorrect unit conversion factor was applied to the moment coefficients.

December 10, 2014, Version 4.01

- Fixed bug with API analysis command which automatically generates sensitivity transfer functions. Results could be wrong if each XLTransferFunction sheet used in the model did not have the same list of frequencies.
- Fixed bug with consistent mass element. Results would be wrong if on the Shaft Input sheet the density units are kg/mm^3 or modulus units of N/mm^2.
- On an XLTransferFunction worksheet there is now an option to unwrap phase in the Bode plot.

November 1, 2014, Version 4.0

- Active magnetic bearings can now be modeled with a new bearing template named XLTransferFunction. Files showing how to use this are in the Examples folder and have AMB in their file names. This feature can also be used with frequency dependent seals.
- Transfer functions can be imported from Matlab. Look for Import Matlab in the online help.
- There is a new API analysis command to automatically generate transfer functions required by the latest edition of API 617. Search for API AMB in the online help.
- A conical consistent mass finite element has been added. See Options/General in the online help.
- In the Geo Plot different speed groups of the model can be displayed with different colors. See Options/General in the online help.
- Crosshatching of the model geometry plot can be done according to different speed groups, and both the top and bottom portions of the model can now be hatched. See Material Property Boxes in the online help.

- The Show Zetas command can now also be used on plots of damping factor to label points with frequency. See Show Zeta in the online help.
- The model importers have been updated for more recent versions of ARMD and Dyrobes.
- Improved compatibility with non-English installations of Office.
- Numerous other enhancements.

October 7, 2013, Version 3.945

- Bug fix where the program would not run a transient analysis case if there were no imbalances defined on the Imb's worksheet. This bug affected only versions 3.943 and 3.944.

October 1, 2013, Version 3.944

- Bug fix where imbalances assigned to station 1 were left off for response runs done with the FE solver. This bug affected only version 3.943.

September 24, 2013, Version 3.943

- The conversion of time history plots to FFT's was improved to better handle non-uniform time history sample rates.
- For imbalance response calculations, couple imbalances can now be specified (i.e. with units like oz-in^2 or gm-mm^2).
- The API Level2 and API Response commands can now be used in torsional files. These enable running multiple eigenvalue cases and response cases with one mouse click.
- The root sorting algorithm used in damped eigenvalue runs was improved.
- Updated the Dyrobes model importer to handle a new version of that program's files.
- Fixed problem that prevented analysis with XLRotor files saved on network drives.
- Numerous other additions to improve robustness, speed, and work around bugs and compatibility issues with different Excel versions.

June 29, 2013, Version 3.942

- Bug fix involving output of mode shapes. Only affected backward modes, when the option for using negative frequency for backward modes is ON, and only for models using the FE solver. This bug was only in prior versions 3.94 and 3.941.

- New feature: Bearing worksheets can now be in units different from the units of the rotor model. This allows SI unit bearing sheets to be used with US unit rotor models, and vice versa.
- Other performance improvements.

June 19, 2013, Version 3.941

- Fix for the XLRotor Ribbon tab related to startup errors on computers configured in a non-English language.
- Two bug fixes in the XLSFD module for squeeze film dampers. First bug caused damping values too large. Errors were slight at small eccentricity, but larger at large eccentricities. Second bug only affects the Closed-Ended Full-Film option. Output values were being multiplied by L^2 when it should have been R^2. This would not matter if L=R, but if the damper were shorter than R the output values were too small, and if bigger they were too big.

April 12, 2013, Version 3.94

- New XLRotor Ribbon tab which appears in Excel 2007 and 2010. The XLRotor ribbon, toolbar and menu can be enabled & disabled in XLRotor/Options/Other.
- The Label Amplification Factor command now provides an option to enable labeling of single-sided peaks. This is for labeling of critical speeds that have a half power point on only one side of the peak. See Label Peak Amplification Factor in the online help.

October 28, 2012, Version 3.93

- Management of computer memory has been rewritten to enable calculation with extremely large models with the FE solver. Calculation speed with the FE solver is also now faster.
- In the Geo Plot, you can now delete the bottom half of the model cross-section and the program will keep it this way during subsequent updates. To restore the bottom half, delete the Geo Plot sheet and then do an Update.
- For torsional analysis harmonic response there are two new features. One is for performing time waveform analysis to determine output amplitudes. The other is to specify a proportional damping constant for the entire model. See XLRotor/Options/Response in the online help.
- When calculating free-free modes of lateral models with the FE solver, the program no longer inserts small springs to stabilize what would otherwise be an ungrounded model.

Therefore, rigid body modes will now have frequencies which are essentially zero instead of a few tenths of a Hertz.

- When labeling points on a damped natural frequency map with their corresponding damping values (using the menu command ***XLRotor/Zetas/Show Zetas***), values for unstable modes will be displayed with a **RED** font.

- When making mode shape animation files (using the menu command ***XLRotor/Animate/Generate Animation GIF File***), the program will now allow you to specify the file name instead of always using Xlrotor_Chart_Animation.gif.

- When exporting all or part of a model to an AutoCad or SolidWorks file (using the menu command ***XLRotor/File/Export…***), the program will now allow you to specify the name of the exported file.

- There is now an XLRotor Start Menu item called Using XLRotor with Excel 2007 and Excel 2010. Refer to this file for tips on using XLRotor with the newer Excel versions.

- There is now an XLRotor Start Menu item called How to Edit the XLRGRPH2007 File. This file explains how to customize XLRotor chart formats.

- The XLRotor Tools.xla and Chartool.xla utilities have been updated for compatibility with Excel 2007/2010.

- Added a fix for an Excel 2007/2010 bug that sometimes would prevent the overlaying of the model geometry on a mode shape. This Excel bug affected only computers configured to operate with a non-English language.

- Various other fixes to improve compatibility with Excel 2010.

April 15, 2012, Version 3.91

- Fixed bug with XLRotor/Run/Maneuver Response command introduced in version 3.80. The speed of the shaft was incorrectly fixed at 1 radian/sec instead of the actual input value.
- Other minor improvements.

April 3, 2012, Version 3.90

- Improved compatibility with Excel 2007 and Excel 2010, plus much faster execution with these versions of Excel.
- Revamped installer to better handle security restrictions of Windows Vista and Windows 7. Administrator privilege is still required when installing XLRotor, but not to run XLRotor after it is installed.

- New installer puts Examples and Templates folders in the Program Data folder of the currently logged Windows user account. These folders used to be subfolders in the XLRotor program folder. Windows security restrictions of a non-administrator account is the reason for this change.
- The XLRotor chart template file named Xlrgrph.xls has been replaced with two files named Xlrgrph2003.xls and Xlrgrph2007.xls. The first file is used with Excel 2003 and earlier, and the second is used with Excel 2007 and later.
- New commands added to the Modeling menu to reverse a model end-to-end, reorder the beams of a model, and split a beam into a pair of 45 degree stacked beams. Search for modeling in the online help.
- The XLJrnl module for fluid film bearings now allows eccentricity to be specified instead of load. Look for XLJrnl in the online help.
- The XLJrnl module no longer uses data tables from the Someya data book on bearings. All data tables have been calculated with XLHydrodyn.
- The XLJrnl module now allows multiple XLJrnl worksheets to be run with one mouse click. Look for XLJrnl in the online help.
- Fixed bug in XLJrnl module where if speed dependent load and/or clearance was specified, the stiffness and damping coefficients were incorrectly determined. The program was using the last load or clearance for every speed, instead of the input value for load or clearance.
- Updates to some of the rotor bearing model importers.
- Updates to the security key software and network license server.
- Fixed problem that could cause response calculations to fail if the model had a very large number of bearings.
- Fixed bug with calculating Amplification Factor for critically damped modes during a damped eigenvalue analysis.

July 4, 2010, Version 3.84

- Incorporated a new workaround for a known bug in Excel 2007 that sometimes prevents the Geo Plot from displaying and/or printing correctly.
- On bearing worksheets the charts which display the stiffness and damping coefficients will now utilize regular Excel cell ranges instead of defined names. This should

eliminate occasional run time errors that happened when clicking the *Update Curve Fits* button.
- The new Modeling commands did not work correctly with torsional models. This has been fixed.
- Other minor changes to improve compatibility with Excel 2007.

June 16, 2010, Version 3.83

- Some minor fixes in the modeling command for creating stacked beams. Search for modeling in the online help.
- Fixed the Update Curve Fit command which is on all bearing worksheets. The command will now function properly when linear interpolation is being used.

June 6, 2010, Version 3.82

- The program can now automatically check the internet for version updates, and also can inform you when your technical support and upgrades period is due to expire. These actions can also be turned off. See *Options/Other* in the online help.
- The program can now be directed to automatically create shear and bending moment diagrams as part of a deflected shape calculation. See *Run/Deflected Shapes* in the online Help.
- On API Level 1 and 2 stability worksheets, the input value for Critical Speed Ratio now offers additional ways to specify the subject mode. See *API stability analysis* in the online help.
- When generating an ODS chart of asynchronous response, a label in the chart would sometimes display an incorrect value for speed.
- Changes to XLHydroDyn to make convergence more robust.

April 20, 2010, Version 3.81

- Resolved an occasional crashing issue with some installations of Excel 2003.

March 27, 2010, Version 3.8

- Much improved compatibility with Excel 2007.
- Corrections in the XLJrnl lookup table database. This affects the coefficients for the 4 Lobe sleeve load on groove bearing, and 6 and 7 pad tilting pad bearings.
- New option to do piecewise linear interpolation for bearing coefficients. See Curve Fitting in the online Help.

- New Modeling menu with commands to speed up creation of models. Search for modeling in the online help.
- A new program named XLHydroDyn for design of fluid film bearings is now available as an extra cost option. Search for XLHydroDyn in the online Help.
- Internal workings of the FE solver have been extensively rewritten resulting in faster execution. This also lays groundwork for future enhancements.
- Fixed a bug where eigenvalues computed with the transfer matrix method could be incorrect if they were calculated <u>after</u> performing an asynchronous response analysis.
- Numerous other minor enhancements.

April 6, 2009, Version 3.75

- Improved compatibility with Excel 2007.
- Added new feature to API Response analysis. ODS plots can now be obtained for an arbitrary list of speeds. See API Response Analysis in the online Help.
- Xlrotor can now create animation files for <u>any</u> Excel chart, not just mode shape chart. See Animate in the online Help.
- Added a new command to the Xlrotor pull down menu to check the internet for the latest version of the Xlrotor software. There is also a button on the Xlrotor splash screen displayed during start up.
- When computing torsional critical speeds, a table of torsional critical speed margins at maximum speed is now automatically generated.
- When computing torsional critical speeds, mode shape output now includes the normalized stress at every station.
- The labeling of speeds in a polar plot of imbalance response has been improved.
- Fixed a bug that in rare instances caused the solver to stop without finding a solution during response calculations. This could only happen when a bearing or seal contained cross coupled mass terms.
- Fixed a bug in the calculation of the angle of orientation for the major axis of response orbits.
- As part of mode shape output for undamped critical speeds, a table of strain energy is now produced.
- When doing a response analysis, rotational dof can now be output in radians. This is specified on the Imb's worksheet.
- Numerous other small enhancements.

May 18, 2008, Version 3.7

- Xlrotor is now compatible with Excel 2007.
- The mode shape animator can now generate a single animated gif file of the animation. See "animate" in the online Help.
- Xlrotor can create an animation file for any Excel chart whose frames are controlled by a single cell value.
- The online Help file is now a compiled HTML file (CHM). Windows Vista by default does not support old style HLP help files. Xlrotor can be directed to use either the new CHM file or the old HLP file.
- There is now a printable and searchable manual in a single PDF file. See Start/Programs/Xlrotor/Xlrotor Manual.
- There is a new type of analysis call Maneuver Loads. Look for "maneuver" in the online Help.
- There are new features for performing "API" style of response and stability analyses. This is a versatile tool that can be used to automate analyses. See "API" in the online Help.
- Model levels which consist of a single station (like dampers and bearing supports) are now automatically depicted offset from the shaft centerline.
- Labeling of station numbers on the geometry chart can be suppressed by entering zero for the station increment.
- Imbalances can now be entered in units of gm-mm.
- When computing very large numbers of mode shapes or deflected shapes, the program now automatically starts a new sheet when the Shapes or Resp sheet is full.
- The Label Amplification Factor & Separation Margin command now takes a speed range instead of just maximum speed. See "amplification factor" in the online Help.
- Xlrotor routines are now easier to call from your own macros. See "macro" in the online Help.
- Amplification Factor is now a choice for the output of the real part of damped eigenvalues. See Options/Eigenanalysis in the online Help.
- When overlaying model geometry on mode shapes, you can now do multiple charts in one operation. See "overlay geometry" in the online Help.
- Various other assorted refinements.

June 21, 2007, Version 3.6

·   This program version requires a new USB type hardware
    security key. The USB key is black colored, and replaces
    all previous parallel port and USB keys (i.e. dongles).
    The new key does not require installation of any special
    drivers.

·   Some minor fixes to the program.

April 28, 2007, Version 3.52

·   Fixes to improve compatibility with foreign language
    installations of Windows and Microsoft Office.

March 22, 2007, Version 3.51

·   Fatigue analysis has been added. See "Fatigue analysis" in
    the online Help.

·   Other minor fixes.

February 11, 2007, Version 3.5

·   The FFT button can now be used to compute the frequency
    spectrum of any Excel data. See "FFT" in the online Help.

·   There is a new option enabling peaks in response plots to
    be automatically refined so they will have enough points to
    be accurately defined. See Options|Response in the online
    Help.

·   System damping and mass matrices can now be exported. See
    "export" in the online Help.

·   Dyrobes file importer now supports conical beam elements.

·   A new example file illustrates how to use an Excel macro to
    copy Xlrotor results to a Word document.

·   Three new option settings for sorting and display of damped
    eigenvalue results. One option enables backward modes to
    be plotted with negative frequencies.

·   XLGasLaby – An all new analysis worksheet for compressible
    flow labyrinth seals. Computes rotordynamic coefficients
    and leakage rates for teeth-on-rotor, teeth-on-stator or
    interlocking seals.

·   Cross-hatching of the model geometry chart can now be done
    by material, density, modulus or element level. A legend
    can also be included.

- A new option for the Geometry Chart for labeling added weights with their values. Symbols and labels can be customized. See "Options/General" in the online Help.
- A new option to write all model data to a macro in the code-sheet of every analysis result worksheet. This feature helps document your work. See "Options/General" in the online Help.
- The switching of imbalance response plots from Bode to Polar format now also creates synchronous orbit plots including a key phasor notch and a scroll bar for sweeping the plot through the analysis speed range. Look for "Bode" in the online Help.
- Updating of the model geometry is now faster.
- Mode shape animator can now save the animation frames to individual GIF files which you can use to create animation files.
- Improved error checking throughout.
- Bug fix in the Rosenbrock integrator that affected models that use constraints.
- The model summary table at the bottom of the Stations worksheet has been expanded, and new defined names have been created that make it convenient to reference these values elsewhere. See "Stations Worksheet" in the online Help.
- The SolidWorks exporter now runs much faster, supports conical elements, and exports each element level to a separate sketch.
- Bearing worksheets are now permitted to be hidden using Excel's Format/Sheet/Hide menu command. This can reduce clutter in files with many bearing and/or seal worksheets.
- Linear response output can be in units of displacement (e.g., mils), velocity (e.g., ips), or acceleration (e.g. g's). See the "Imb's Worksheet" in the online Help.
- Purely structural spring elements like trunnions can now be retained when performing an undamped critical speed analysis.
- In an XlTorsion file there are new inputs for Minimum Machine Speed, Name of Reference Shaft and Critical Speed Margin. The torsional interference diagram and torsion critical speed table have likewise been enhanced.
- In an XlTorsion file, linear forced responses can now be output in units of velocity. See "Orders Worksheet" in the online Help.

- A true 3 dimensional plot of operating deflected shapes can now be generated when doing a deflected shape analysis. See "Run|Deflected Shapes" in the online Help.
- Rotor models can now be imported from an XLTRC^2 Excel workbook file.
- On XLJrnl worksheets the name of the currently selected bearing type is now placed in a worksheet cell for ready reference. See "XLJrnl Worksheet" in the online Help.
- On XLJrnl worksheets, every time a *Run* is executed, the analysis inputs are documented in a cell comment in the Kxx column. See "XLJrnl Worksheet" in the online Help.
- The XLBallB2 and XLShSeal worksheets now allow any of the inputs to be speed dependent. Look for "speed dependent inputs" in the online Help.
- When called from a macro, the command for labeling amplification factors on response peaks now can be passed an optional argument for MCOS, and it returns an array of the properties of the response peak(s). See "Label Peak Amplification Factors" in the online Help.
- On the Cplg's sheet, the contents of the column named *Type* are now used in the titles of load charts for both linear response and transient response analysis. See "Cplg's Worksheet" in the online Help.
- On the Torsional Interference Diagram (Campbell plot) an excitation line representing a synchronous motor slip frequency can now be created automatically. See "Orders Worksheet" in the online Help.

March 07, 2005, Version 3.1a

- Bug fix. In all versions since 3.05, if the <u>first</u> bearing defined on the Brg's worksheet was a constraint (PINNED/RIGID/GUIDED), this would cause incorrect results for the following analysis types: Response, Deflected Shapes, Static Deflection and Transient. This bug does not affect any type of eigenvalue or mode shape analysis.
- Bug fix. For torsional models only, under certain circumstances updating the Beam's worksheet would cause an Excel run time error.

November 2, 2004, Version 3.1

- There is now a step-by-step tutorial, Xlrotor Tutorial.PDF. See the XLRotor pull down menu in Excel or the XLRotor menu

on the Windows Start button. Requires Adobe Acrobat Reader.

- Support for conical beam elements. See the Xlrotor/Options/General dialog.
- Can now use mm for shaft length units. Just change the units in the column heading for Station Length to "mm". The program will change the rest when you Update Geometry.
- Can now use radius or diameter for shaft geometry input. See the Xlrotor/Options/General dialog.
- Animator has been completely rewritten. Now animates both 2D and 3D lateral and torsional mode shapes, single-level and multi-level. Also animates mode shape with full deformed model geometry.
- Can now compute mode shapes for all roots on a selected chart series.
- Geometry chart now uses different symbols for PINNED, RIGID and GUIDED connections.
- Can now import RBTS-ARMD lateral rotor models. On the Xlrotor/File menu.
- Demo version is no longer time limited. Can analyze any model with up to 5 stations. Can also run any analysis with any of the included example files.
- Speed improvements to model updating.
- Other miscellaneous improvements to the user interface.

April 22, 2004, Version 3.07

- The feature for exporting the system stiffness matrix to a text file now works for torsional system models in addition to lateral models.
- Fixed a few small problems with the drawing of geometry plots for torsional models.
- Fixed a bug concerning RIGID/PINNED/GUIDED constraints. The program did not always handle chained constraints correctly. This concerns situations where station i is constrained with station j, and station j is constrained with station k. The net resulting constraint between i and k was sometimes setup incorrectly.
- NEW – For torsional mode shapes added a new option in the Xlrotor/Options/Eigenanalysis dialog box. When drawing torsional mode shapes all branches can be shown on a common centerline (this is the old way), or side branches can be offset to the side the same way the geometry plot is drawn.

- Fixed a problem with error checking of torsional models. The program would sometimes not allow a coupling to connect two stations within the same level.
- In the file LUBE.XLS there was an error in the formula for computing specific heat from the lubricant's specific gravity and temperature. The specific heat was listed for information only, so this bug does not actually affect the Xlrotor program in any way.
- Fixed various small problems with the user interface.

3/7/2004, Version 3.05

- Added some new features to enable control of program output when running user macros. This helps user macros run faster. Search on the word "macro" in the online Help for details.
- New feature: exporting of system stiffness matrix to a text file. In the online Help search on "stiffness matrix" for details.
- New feature: material property boxes on a model geometry plot now have popup tool tips that show the material property values. Tool tips are limited to 32 characters, so code truncates at 32.
- The formats used when generating new worksheets of eigenvalue results can now be customized in the XLRGRPH.XLS template file.
- Fixed bug affecting a lateral transient analysis that has both a variable rotor speed AND has at least one RIGID, PINNED, or GUIDED constraint.
- Fixed minor bug affecting transient analysis with lateral models that had no bearings, or torsional models that had no couplings.
- Xlrotor will now execute properly with Excel's option setting for worksheet formula recalculation is set to either Manual or Automatic. Used to require calculation be set to Manual.
- Added some new examples, including showing how to do proportional damping in torsional models.
- Various changes to provide better support of languages other than English.
- Improved model error checking performed on each analysis run.

9/07/2003, Version 3.02

Added option to orient geometry chart vertically.

- Added an example file showing how to use a macro to perform iteration with a pseudo-nonlinear model, like a hardening spring in a bearing.

8/14/2003, Still version 3.01

- Added option for GUIDED connections.
- Can now import DYROBES lateral and torsional rotor models. On the Xlrotor/File menu.
- Eigenvalues for torsional models are now computed without the need for grounding springs.
- When you change the chart formatting on a damped roots worksheet, those formats are now retained when you overwrite the sheet with a new set of roots.
- Some new example files.
- Other minor enhancements to the user interface.

6/11/2003, Version 3.01

- Fixed problem with handling of RIGID and PINNED connections in certain types of multi-level models.
- Fixed some minor problems with the user interface.
- Changed the program in how it assembles bearings which connect two stations which are not at the same axial location.
- Two Excel utilities called Chartool and Xlrotor Tools are now installed by default. See the files Chartool.doc and Xlrotor_Tools.doc for descriptions.
- Torsional mode shapes are now placed on the same worksheet with the torsional eigenvalues, instead of on a separate "Shapes" worksheet.

3/26/2003

- Fixed problems with use on a computer operating in a non-English language.
- Fixed some compatibility problems with Excel 2002.
- Improved the data written to the xlrotor.txt tracking file.
- Removed some obsolete menu commands.
- Added Chartool Excel charting utility to the installation CD (can also be downloaded at www.xlrotor.com).

- Improvements to the RAPP/PUP file importer.
- Added a table of final conditions to the Transient worksheet, which is overwritten after every transient analysis.
- Fixed problems that sometimes caused Xlrotor to crash Excel while starting up.
- Numerous other minor fixes and enhancements.

1/2/2003

- Fixed problem with the Xlrotor custom pull down menu. The Xlrotor menu was causing Excel's custom toolbar file (named EXCEL.XLB, or similar) to gradually get larger. The problem has been corrected, but it may be required to manually delete the EXCEL.XLB file to rid it of erroneous content. Deleting the file is recommended if the file is larger than 100 kilobytes.

12/28/2002, First release of version 3.0 of Xlrotor.

- PINNED and RIGID bearing connections
- Automated embedding of bearing worksheets into rotor files
- "Quick Bearings"
- XlJrnl module allows speed dependent inputs
- More example files, >75
- Transient analysis via numerical integration
- User defined nonlinear elements in VB, Fortran, and C
- Transient results in time, orbit, and FFT plots
- Analyses automatically documented with cell comments
- New torsional analysis capabilities
- multi-branched systems, open and/or closed
    o damped torsional interference diagram
    o damped mode shapes
    o linear response to harmonics (engine orders, etc.)
    o operating deflected shapes
    o transient analysis: startups, electrical faults, etc.

8/6/2002

- Fixed bug in handling of Gear_Ratio for torsional analyses. This bug only effected torsional mode shape output for certain types of torsional models.

9/8/2001 Version 2.03

- Fixes incompatibility with the version of Excel that ships with Office XP.

6/27/2001

- Enabled Xlrotor to find the printer port security key even if the computer was booted without the key attached.

6/4/2001   Version 2.02

- Fixed a bug with the Xlrotor/Run/Static Deflection command. For models created in SI units, this command was computing the static deflection due to mass in kg, instead of weight in Newtons.
- Widened all the textboxes used for chart titles in the XLRGRPH.XLS chart template file.
- General improvements to error checking. Fixed some incompatibilities with Excel version 2000.
- All Xlrotor files, new and old, contain a macro called ButtonHandler. This macro is called whenever you click an Xlrotor button that appears directly on a worksheet. This macro is now updated automatically with new code each time you open an Xlrotor file.

1/30/2001

- In the XLBallB.XLS ball bearing analysis templates, fixed problem with the Update Curve Fit button. This problem was specific to Excel 97 and up, and did not occur with Excel 95.

1/18/2001

- Created a new option for generating a Damping Factor Map as part of a Damped Eigenanalysis. There is a check box for this option in the Options/Eigenanalysis dialog box.
- Corrected bug introduced in the 10/18/2000 version that placed the wrong title on bearing load plots created by the Run/Response command.

1/10/2001

- Fixed XLJrnl to not permit specifying a negative journal load.
- Fixed problem that sometimes caused the geometry plot of multi-level models to appear incorrect.
- Xlrotor 2.0 and later will no longer run with Excel 5.0 (the last 16 bit Excel version). Excel 7.0 or later is now required.

10/18/2000

- Improved error checking to catch invalid bearing inputs. Fixed problem where incorrect label was placed on Shapes worksheet for certain types of mode shape output options.

10/1/2000

- Improved error checking to catch invalid station numbers for imbalance definitions and response outputs.
- Added option to suppress "Done" message boxes displayed at the end of all analysis commands. Other changes to better allow customer-written Excel macros to run multiple Xlrotor analyses in succession.

8/24/2000

- Fix a few minor problems with the user interface.

8/6/2000

- New menu commands added to export model geometry to SolidWorks, AutoCAD or the ROMAC Modal program. For SolidWorks a Visual Basic macro is created which can be executed within SolidWorks. For AutoCAD you can export to either a Visual Basic macro or to a DXF file. For the ROMAC Modal program, an input file is created in that program's input format.
- A new menu command has been added to import a complete rotor/bearing model from a RAPP/PUP input file.

8/3/2000

· Command for labeling Amplification Factor (AF) on a
  response plot can now also label the Maximum Continuous
  Operating Speed (MCOS) and Separation Margin (SM)

6/4/2000

· Created "Xlrotor Tools.XLS" file containing macros which
  can be useful in files other than just Xlrotor files.
  Place this file in the Excel/XLStart directory.

5/19/2000

· Added option in the Options/Eigenanalysis dialog box to
  allow turning off the display of the Root Locus plot.

5/17/2000

· Added the choice of Overwriting a Response or Shapes
  worksheet.

5/16/2000

· Added the choice of "Yes to All" when adding new options to
  an older Xlrotor rotor file.

4/8/2000

· Fixed problem with the "Label Amplification Factor"
  command. Sometimes the half power point interpolation was
  not done using the best available points.

3/19/2000

· Added new command to the Run menu to compute Static
  Deflection.

2/27/2000

· Improved the "normalizing" of mode shapes.

1/22/2000

· Created new menu commands to Show/Remove material property boxes from the Geometry chart.

8/19/1999

· Made compatible with Excel2000 (Excel version 9.0)

8/1/1999

· Xlrotor 2.0, first multi-level version.

4/2000

· Xlrotor 1.44, last version of Xlrotor without copy protection. Single line rotor models only.

1995

· Xlrotor 1.0. Single line rotor models only.