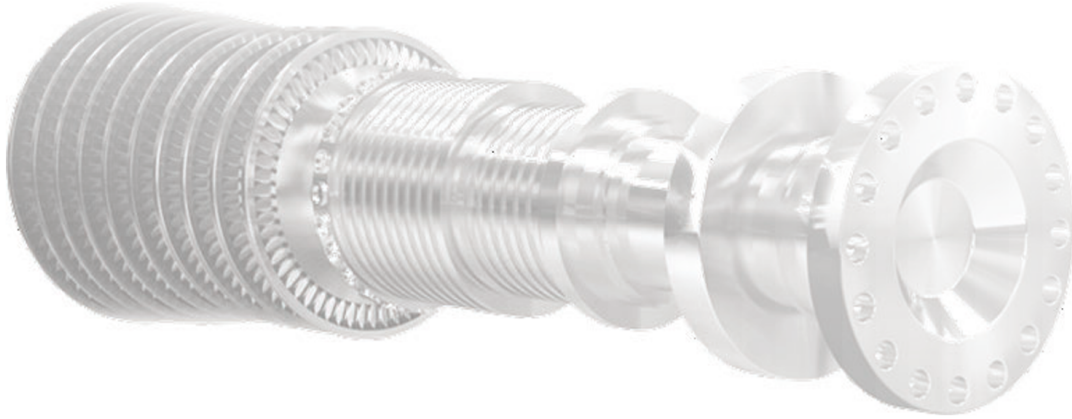




Rotor Bearing System Design and Analysis

The AxSTREAM® Advantage

Purchase options are individually tailored for each customer.

Extremely cost-competitive compared to similar software packages; protected by ESS-G®, SoftInWay's price match guarantee.

Integrated solution from aero to rotordynamics.

Automation of analyses and workflow through batch processing and AxSTREAM ION™ for process integration and design optimization.

Extensive technical support by more than 100 engineers.

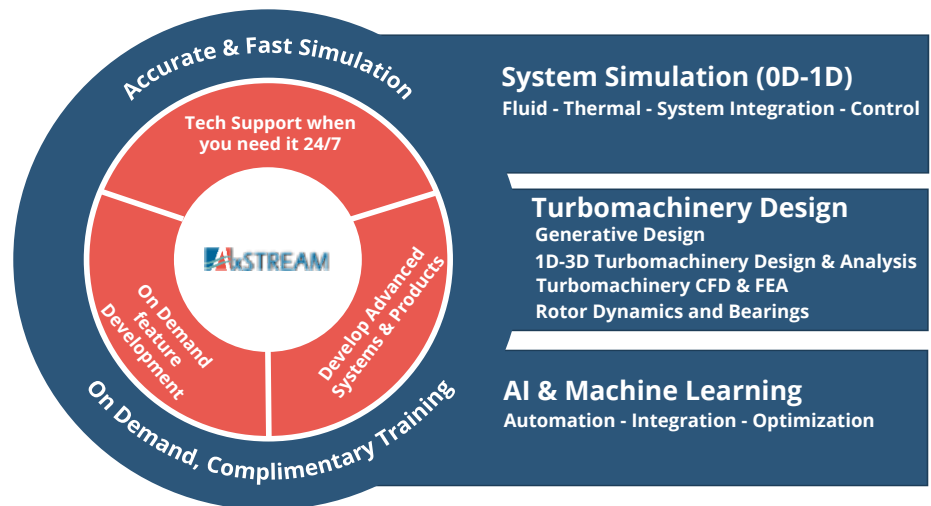
Streamlined user-interface makes learning a nonissue.

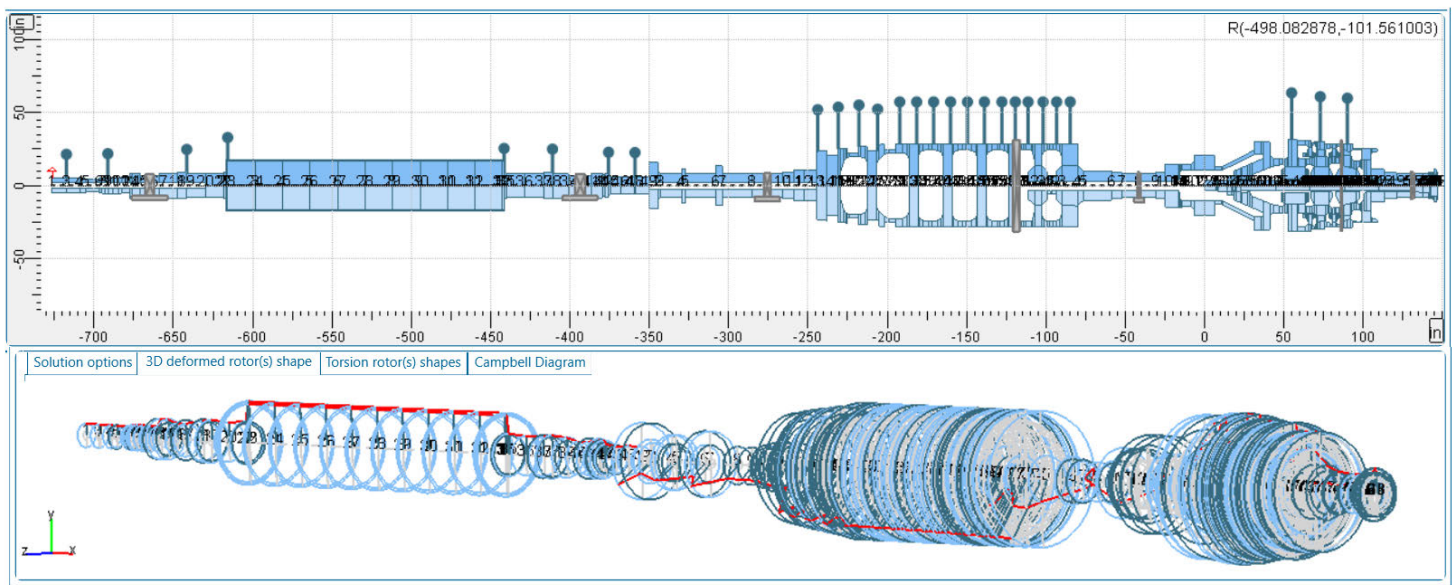
Constant updates are being added, and new features can also be added upon request.

Software Solutions | Consulting Services Training and Technology Transfer Turbomachinery Mastered

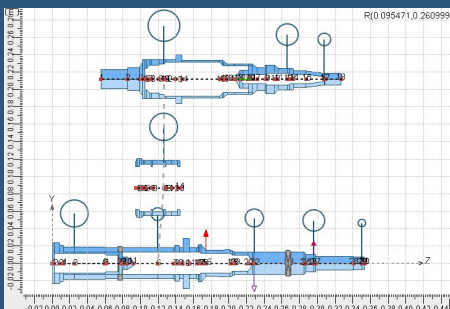
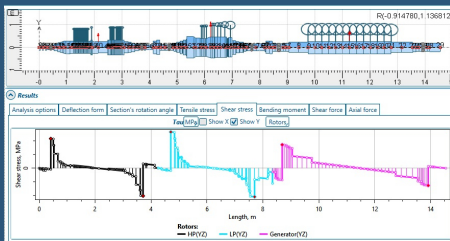
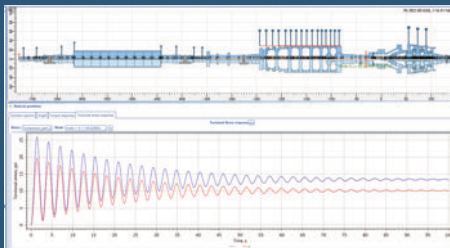
SoftInWay, Inc. is a global R&D engineering company specializing in the development of efficient turbomachinery components and systems by offering its industry leading software platform, AxSTREAM® for rotating machinery design, redesign, analysis, and optimization, as well as engineering services and educational courses.

AxSTREAM Integrated Architecture





Packages



AxSTREAM RotorDynamics™

AxSTREAM RotorDynamics™ is a finite element based program that allows users to perform the full scope of rotor dynamics analyses for any rotating machine (turbine, compressor, pump, electrical, reciprocating machines, machines with active magnetic bearings, and many others).

AxSTREAM RotorDynamics™ supports linear and nonlinear analyses and enables comprehensive modeling of lateral, torsional, and axial dynamics of rotor systems. Multi-shaft and multi-branch rotor systems with complex support structures are easily modeled and simulated, generating results almost instantly once a model is built.

Pre and postprocessing capabilities are aligned with industry standards (API, ISO), helping engineers efficiently assess rotor designs and their dynamic performance with respect to standard requirements.

• Modeling

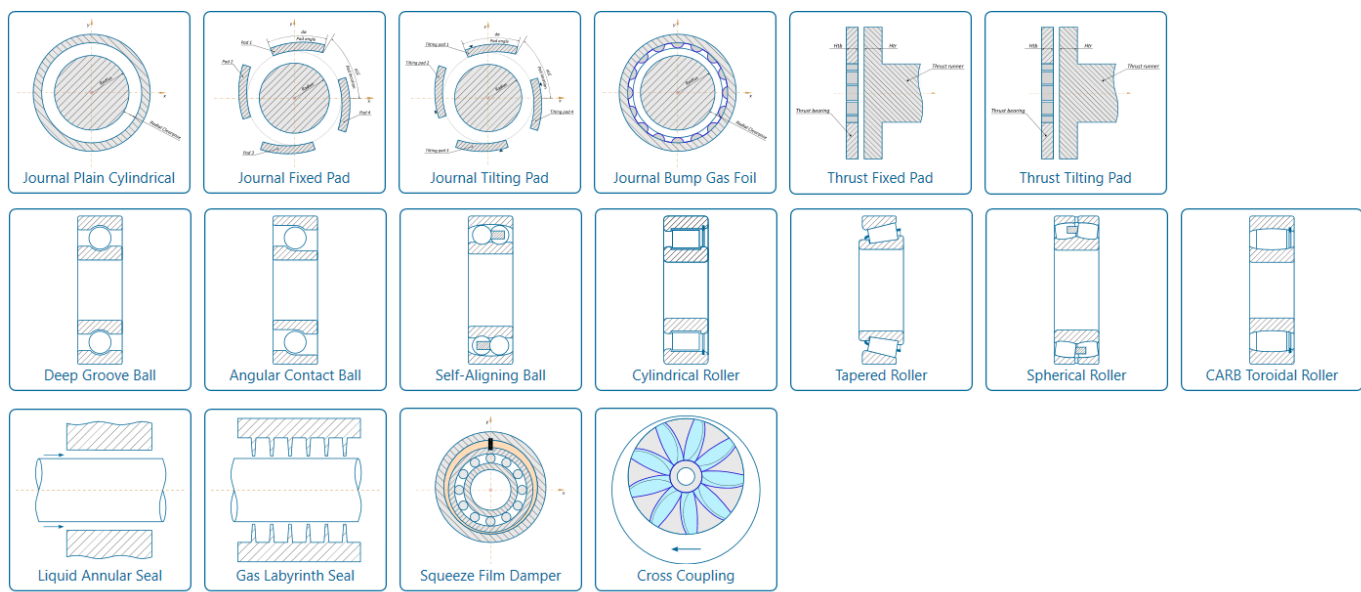
- FE analysis with 1D beam/2D axisymmetric approaches, and auto mesh generation
- Detailed rotor representation including shafts, disks, impellers, etc.
- Couplings and gearboxes for modeling multi-spool systems
- External forces including unbalance, gravity, user-defined static and dynamic loads
- Different approaches for bearing modeling, including linearized stiffness and damping coefficients for journal and thrust bearings, as well as nonlinear fluid-film behavior for hydrodynamic journal bearings
- Structural support modeling (casings, bearing housings, foundations, etc.)
- Rotor material library with temperature-dependent properties

• Simulations

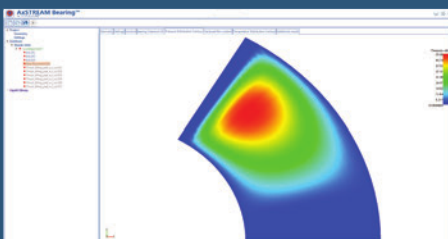
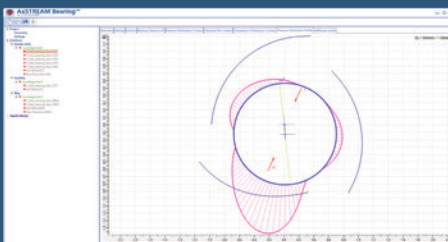
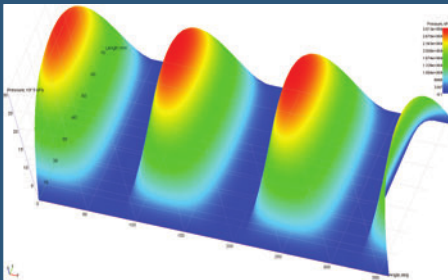
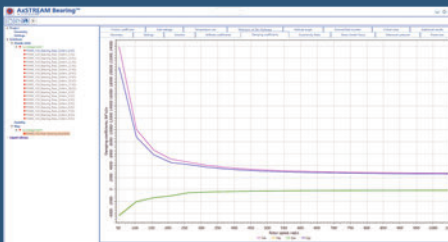
- Lateral: static deflection/bearing reactions, critical speed, transient, damped unbalance/harmonic response, stability, Campbell diagram, and waterfall analyses
- Torsional: modal, Campbell diagram, transient analyses, and harmonic analysis for different machines, including reciprocating machines
- Axial: modal analysis

• Post-processing

- Evaluation results according to industry standards (API, ISO, etc.)
- Machine-specific analysis (turbines, compressors, pumps, etc.)
- Automated report generation and batch processing
- Integration with AxSTREAM Flow Path for automatic rotor model generation and auxiliary conditions
- Visualization tools (animated mode shapes, charts and parameters)



Packages



AxSTREAM Bearing™

AxSTREAM Bearing™ can simulate practically any type of bearing utilized in turbomachinery and rotating equipment. Users can evaluate bearing behavior in terms of load capacity, dynamic coefficients (stiffness and damping), and other performance characteristics. Seals, squeeze film dampers and other auxiliary components that influence the rotor dynamic response can also be simulated within AxSTREAM Bearing™.

The user interface was developed to provide an easy way to work with complicated bearing designs, and projects where multiple calculations must be done (rotor-bearing systems analysis projects, sensitivity studies, and design optimizations).

- **Fluid & Gas Film Bearing Geometry**

- Journal: plain cylindrical, fixed pad, tilting pad, and bump-type gas foil bearings
- Thrust: tilting pad, fixed pad

- **Rolling Element Bearing Geometry**

- Deep groove, angular contact, self-aligning ball bearing models
- Cylindrical, tapered, spherical, and CARB toroidal roller bearings

- **Auxiliary components**

- Seals (labyrinth, liquid annular)
- Squeeze film dampers
- Aerodynamic cross-coupling coefficients calculation

- **Simulations**

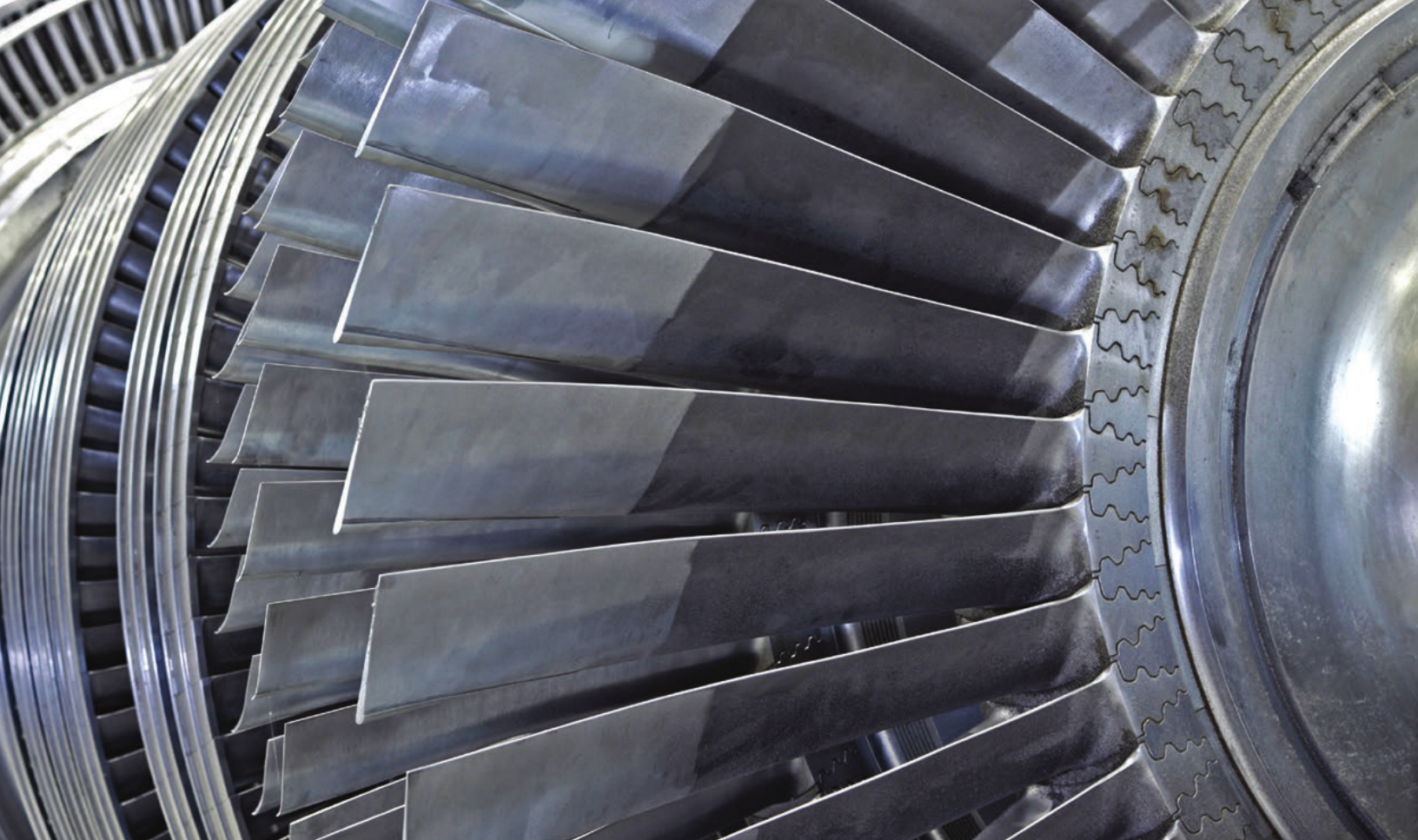
- Bearing design (preliminary parameter selection) and bearing maps
- Steady-state and bearing map analyses
- Nonlinear transient analysis for journal bearings
- Simulate different configurations and design parameters: multi-groove, spiral and herringbone grooves, preload, offset, and clearance variations etc.

- **Post Processing**

- 2D / 3D visualization of results, report generation and results export
- Plots of bearing performance
- Batch calculations for convenient design iterations

- **Approaches**

- Reynolds equations for fluid film bearings
- Finite difference/finite element methods
- Various approaches for roller element bearings, including contact and elasto-hydrodynamic theory
- Real gas effect considerations for gas-film bearings



SoftInWay

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