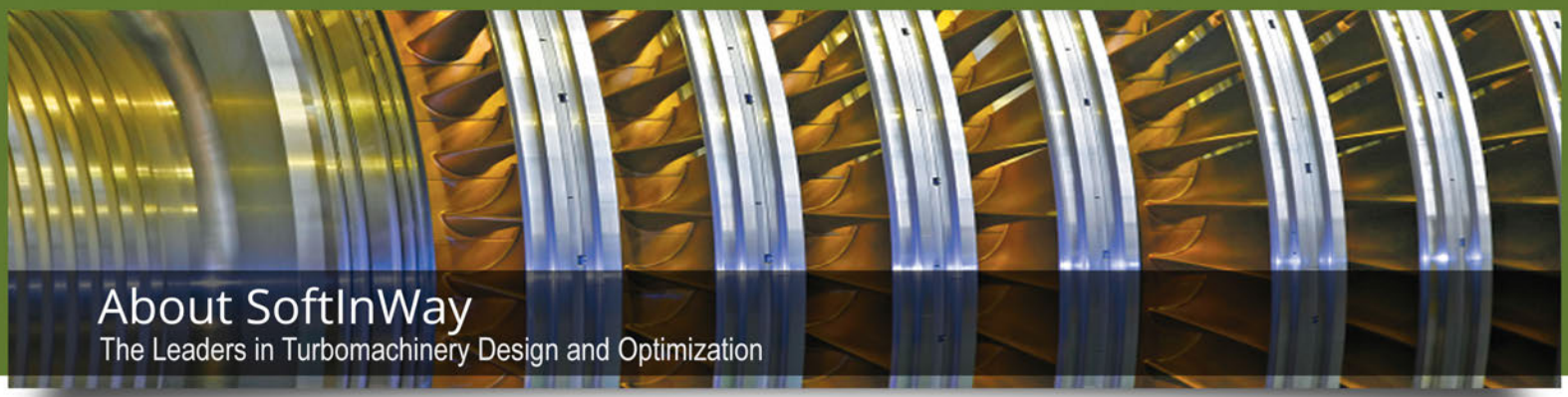
Engineering Services

design. analyze. optimize.

www.softinway.com



About SoftInWay

The Leaders in Turbomachinery Design and Optimization

SoftInWay, Inc. is a global R&D engineering company specializing in the development of efficient turbomachinery components and systems by offering its integrated and automated software platform, AxSTREAM ® for all steps of the turbomachinery design, redesign, analysis, and optimization process (including complete 3D design, thermodynamic cycles, rotor dynamics, and secondary flow and cooling system simulation). SoftInWay also offers a number of engineering services and educational courses, available both online and in a classroom-style setting.

SoftInWay is ISO 9001:2015 and AS9100:2016 certified and committed to providing our customers with products and services that meet international quality standards.

With offices around the globe, SoftInWay supports more than 450 companies worldwide, and works closely with universities, research laboratories, and government organizations.

Industries:

Engineering Consulting Services

The world class engineering services team at SoftInWay possesses a wealth of theoretical, academic and hands-on knowledge in a global setting. This depth of expertise enables us to provide exceptional consulting talent in the challenging field of turbomachinery from turbines to compressors, fans, and pumps. We pride ourselves on enabling each client to overcome the challenges they face in getting products to market faster and at more competitive price points.

Our consulting team is split into six distinct engineering specialties and we assign at least one person from each group to each design project. This allows us to optimize resources, set realistic project deadlines and keep within budget. Our goal is to advance your engineering capabilities, and ensure you are setting the benchmark for quality and state-of-the-art technology in your industry.

Our Team

Our team of engineers from around the world have unparalleled experience in turbomachinery engineering, design and development. From conceptual design to finite element analysis, our team is capable of handing the most challenging of projects.

Turbomachine Mechanical Design

- Conceptual, preliminary and detailed design
- Model development for retrofits and upgrades
- 3D solid modeling and 2D manufacturing drawings
- Auxiliary system design (bearings, lubrication, valves, sealing and governing systems)

1D/2D Aero Analysis, 3D CFD

- 1D/2D/3D CFD analysis
- Compressible / Incompressible Flow
- Steady / Unsteady State
- Map calculation and plotting
- Off-design analysis

Structural Analysis & Reliability

- 3D FEA structural and modal analysis
- Rotor dynamics
- Low Cycle Fatigue (LCF) & High Cycle Fatigue (HCF)
- Creep Analysis

Design of Flow Paths

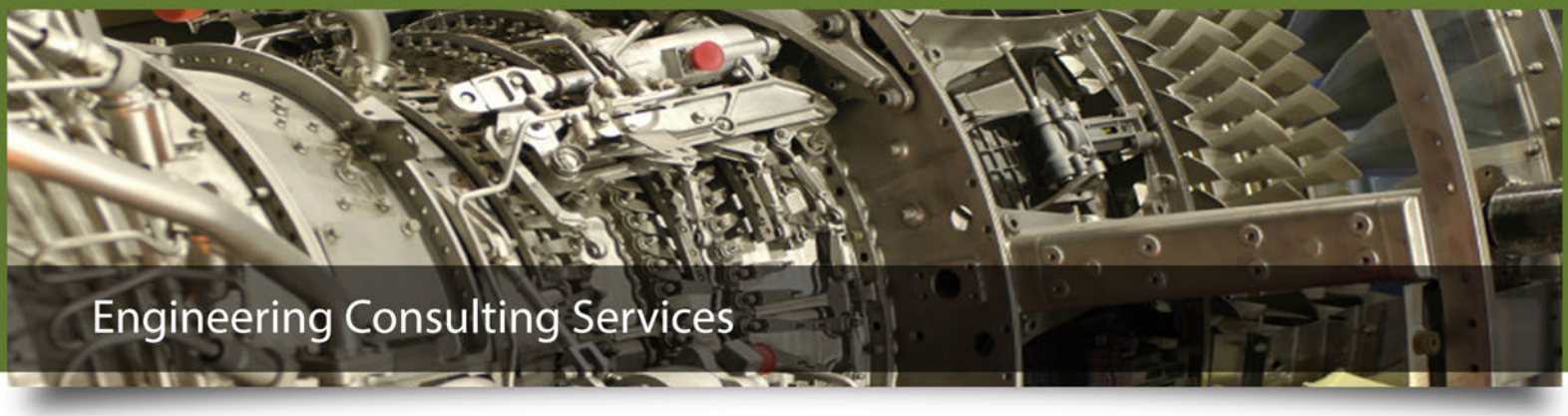
- Conceptual design of flow path
- Aero flow path final definition
- Profiling and 3D airfoil design
- Design of cooled blades and cooling systems

Startup & Shutdown Diagram Design

- HTC calculation
- 3D FEA thermal analysis
- Rotor to stator relative displacement
- Axial and radial clearances evaluation
- Thermo expansions

Thermodynamic Analysis

- Heat balance analysis of power plants
- Design, analysis and optimization of waste heat recovery system
- Conceptual design of thermodynamic cycles
- Power plant equipment cost estimation and investment analysis of plant construction



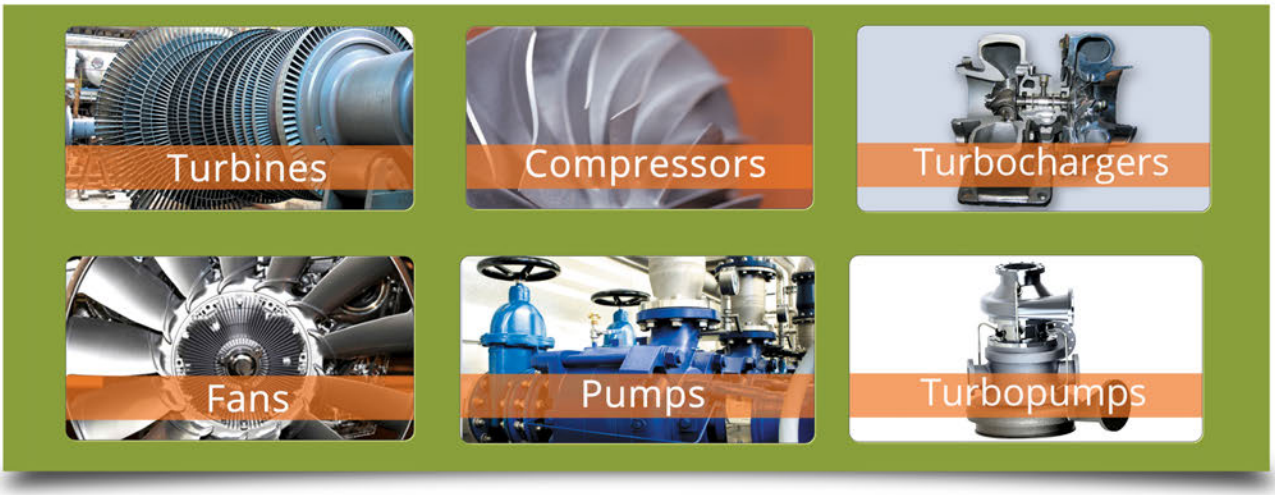
Engineering Consulting Services

Our Process

No two companies are the same; we will work with you to find the best solution.

Every client, project and application comes with a specific set of constraints and usually requires a different solution. Our approach for each project - whether it is a turbine, pump, or compressor - begins with a detailed discussion of project challenges, expectations, and desired outcomes. This allows our engineering experts to help you define technical requirements and select the type of machine and data required for optimal equipment design and efficiency.

Our turbomachinery expertise includes, but is not limited to:



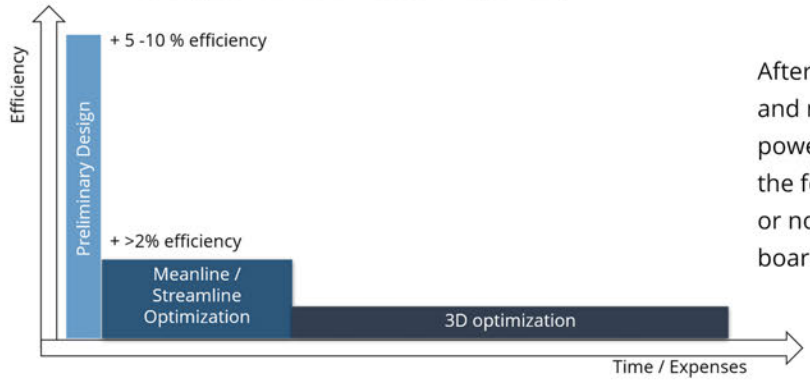
Preliminary Design & Feasibility Studies

Based on the initial project requirements discussed during technical specifications, we can begin performing feasibility studies. Our engineers will help determine the most relevant machine configuration, parameters, arrangement, operating conditions and design constraints in this step on the basis of your specifications.

Sometimes a customer may want to examine an existing machine for benchmarking or as a starting point and we have an excellent team with tools that simplify this task.

The most value can be added at this stage by improving efficiency from existing designs.

Design Process Phases : Efficiency vs. Expense



After this stage is complete, you receive a basic layout, flow path and major component models which satisfy your expectations on power, efficiency and reliability. The end result allows us to evaluate the feasibility of the project specifications and to conclude whether or not we should continue the research or go back to the “drawing board.”

Research & Development

SoftInWay is at the forefront of R&D in the turbomachinery world, providing innovative technology solutions and pushing the future of the technology related to rotating machinery - we are constantly developing industry leading ways to achieve ever higher operating efficiencies in these machines as well as creating cutting-edge technologies to protect the environment.

We strive to identify new technology innovations and deliver that knowledge to our clients project by project.

Gas, Steam, ORC and Supercritical CO_2 machines are just a few examples of the technology we are currently developing for further commercialization, and will work with you to bring your new, innovative technology to market.

From oil and gas to propulsion systems, power generation to our work in turbochargers, SoftInWay Research & Development can leverage this core discipline across numerous verticals to lead our industry in new directions - exploring conceptual ideas and providing fresh insights into established processes.

From feasibility studies to truly groundbreaking conceptual designs and pushing the boundaries of our industry - SoftInWay is here for YOU.

From performing feasibility studies to the final touches on a groundbreaking new design, SoftInWay pushes the boundaries of the industry, and will be with you every step of the way.

Complete Design

We perform all stages of the design process for all types of turbomachines. We begin with a discovery process, sitting down with you to cover your specifications, technical constraints, deadlines and goals. We then move into the conceptual design followed by the real design. Afterwards, you are provided with CAD models of the designed flow path and manufacturing drawings.

Our extensive engineering experience has covered all sectors of turbomachinery design. A few of the projects we have designed include:

- 250 KW ORC Turbine
- HP module for 800 MW Supercritical Steam Turbine
- Centrifugal Compressor for conditional systems
- 3-Stage Low Pressure Turbine Module
- 6-Stage Liquid Oxygen Hydro Turbine
- Waste Heat Recovery system for Heavy-Duty IC engine
- Axial-Radial Compressor for UAV
- Supercritical CO_2 Compressor
- Twin Entry Turbocharger for 2400L engine with intercooler

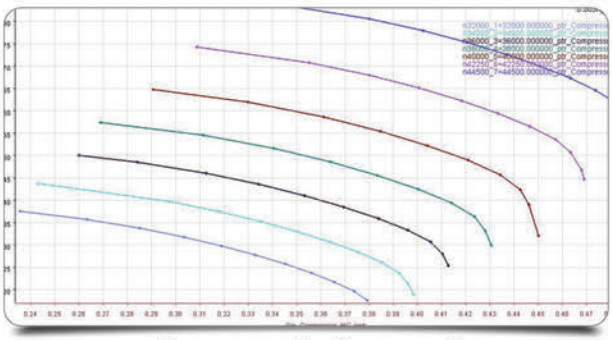
Analysis of Existing Machines

SoftInWay offers extensive analytical expertise in order to evaluate performance, carry out machine and overall cycle benchmarking, simulate design, and various off-design operational conditions. To obtain the geometry of existing machines, we can work with different sources of input information such as 2D drawings, 3D CAD solid models and laser scanned data

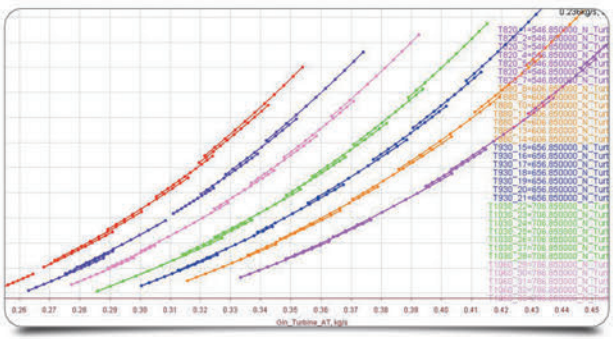
A number of performance maps can be generated for different operating conditions. This allows us to seamlessly generate performance evaluations.

Within the framework of analysis, it is also important to check the impact of sealing types, conditions and clearances and flowpath deterioration.

Our engineering team can also help you optimize existing designs and determine where improvements can be made.



Compressor Performance Map



Turbine Performance Map

Engineering Services

Turbomachinery Retrofitting & Upgrades

In addition to new machine design, SoftInWay offers engineering consulting for retrofitting and upgrading existing machines. Our engineering team will bring outstanding design and analytical capabilities to your projects.

SoftInWay is capable of performing optimization and redesign of existing turbines and compressors taking into consideration both client specification requirements and the limitations of the old geometry (shafts, casings).

Some of the upgrade options include but are not limited to:

- Partial replacement of blading on existing stationary and rotating parts
- Replacement of complete inner blocks (steam path, rotor, inner casing)
- Replacement of complete turbine sections
- Introduction of advanced steam path technology
- Improved gland seal arrangements
- Centrifugal compressor rerate may include conversion of compressor to new process, fluid, and mass flow. There are a number of possible options to consider, including replacement of blading, developing new rule of nozzle rotation, etc.

A few of the upgrade projects we have executed include:

- Highly Loaded Low Pressure Turbine
- 40 MW Team Turbine
- Geothermal Low Pressure Turbine
- 24 MW Reaction Steam Turbine for efficiency improvement

FEA/CFD Analysis

The range of our analytical capabilities is unmatched in the consulting industry, particularly in the area of Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) analysis.

Our engineering team uses the latest FEA and CFD tools and methodologies to determine product configuration and perform optimization, cost and weight reduction, life prediction, system performance evaluation, and failure investigation of mechanical systems. Our engineers are well-versed in many analysis applications.

Our engineering team has extensive experience in FEA/CFD analysis, and welcome any challenge.

Analytical capabilities:

FEA Thermal and Stress Analysis:

Steady-state and transient
Non-linear contact, plasticity, buckling, creep, large deflection
Isotropic, orthotropic, anisotropic materials

Fatigue/Fracture Mechanics:

Goodman assessment
LCF
HCF
Crack growth
Residual life

Dynamics/Rotor dynamics:

Drive systems
Gearbox sizing
Compressor drum response
Linear and damped modal analysis
Forced response analysis
Power spectral density
Harmonic analysis

CFD/AERO analysis:

Compressible and supersonic flows
Laminar and turbulent flows
Flows with conjugate heat transfer
Multiphase flows
Combustion systems
Turbomachinery design
Cooling systems

Heat Transfer Simulations

Most machines, such as high-heat turbines (gas and steam), boilers, and combustors, require strict control of thermal stresses and expansions. SoftInWay's tools and cooling system simulation can calculate parameters of heat transfer between components and outer gas flow. They can also determine temperatures, relative thermal displacements, and thermal stresses.

We can provide a wide spectrum of heat-related calculations, including startup and shutdown cycles, thermal warp effects on static elements (casings, exhaust hoods), and on shafts, and warp and displacement of sealings. We will also help you calculate predictions of a machine's behavior on transient operational modes. If necessary, structural verification can be performed immediately.

Heat-resistant coatings and forced cooling can also be assigned and tested with the understanding that heat calculations are the fundamental base for development of active clearance control.

Rotor Dynamics

SoftInWay is able to perform the full scope of rotor dynamics analysis services, which meet the American Petroleum Institute and International Organization for Standardization standards. Our engineering experts have been performing rotor dynamic analysis and working on vibration problem-solving for over 25 years. Our AxSTREAM® software program RotorDynamics™ enables us to execute this analysis for fast and accurate results.

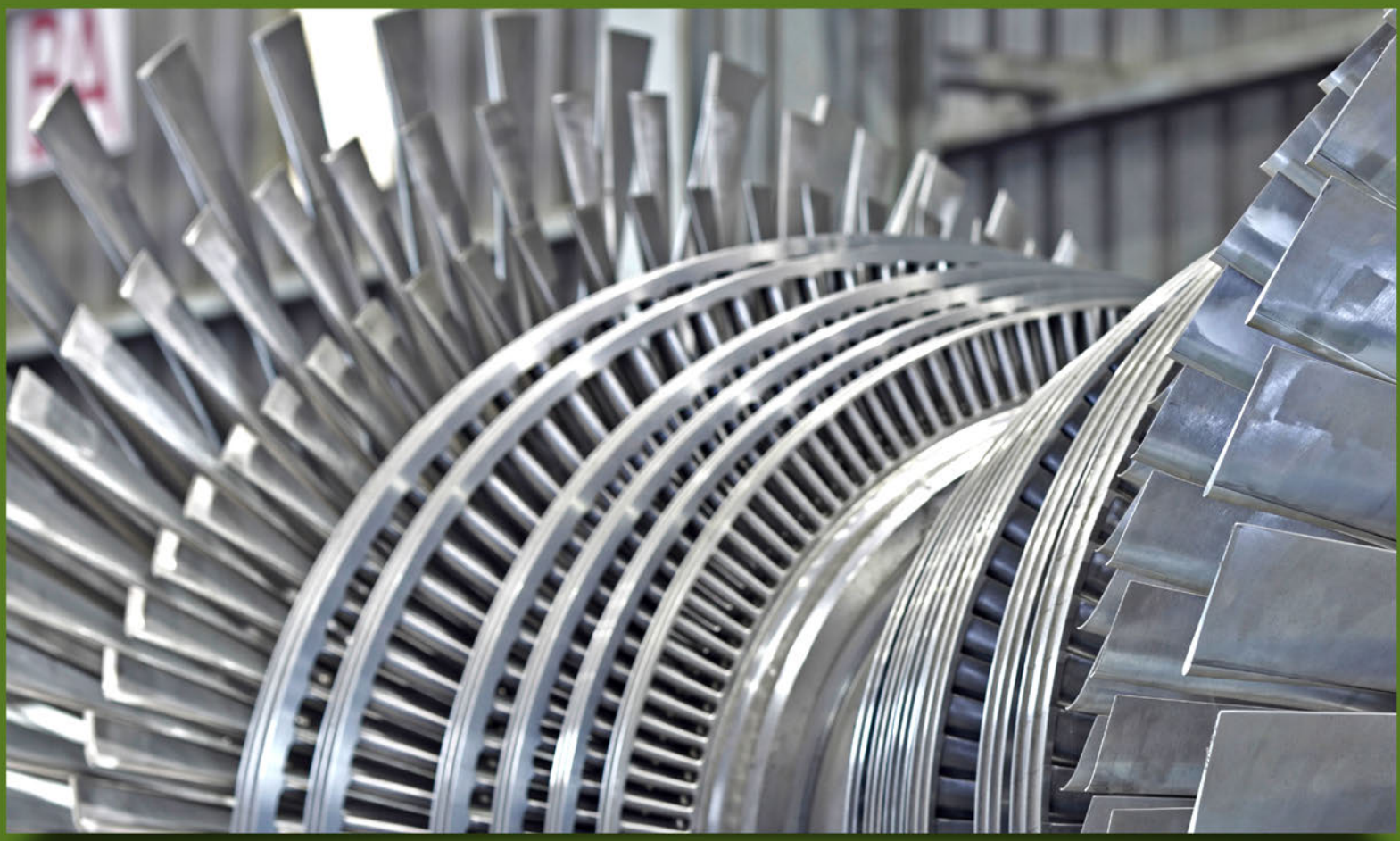
Rotor dynamics is a critical part of the design process, our experts can ensure your designs meet every requirement and standard.

Rotor misalignment, structural support, and temperature dependent material properties can be accounted for.

- Calculations of lateral, axial, and torsional vibrations
- Campbell diagram analysis for damped and undamped systems
- Unbalanced or transient responses calculations
- Computation of rotor system with clearances, full and partial rubbing, external and internal friction and definition of instability thresholds
- Computation of rotor system with nonlinear journal/rolling bearings, squeeze-film dampers, and many other types of rotor studies

These simulations will help to maintain best performance, stability and life of machines.

Want to learn more? Have an engineering problem? Contact us, and we'll take it from there.



SoftInWay incorporated

SoftInWay Offices

SoftInWay Inc.
1500 District Avenue, Burlington, MA 01803, USA
Phone: +1- 781-328-4310 FAX: +1-781-685-4601
info@softinway.com

SoftInWay Marketing and Sales
147 West 35th St. Suite 1504
New York City, NY, 10001
Phone: +1-347-580-1459
sales@softinway.com

SoftInWay Switzerland GmbH
Baarerstrasse 2 – 6300 Zug, Switzerland
Phone: +41 44 586-1998
switzerland@softinway.com

Independent Distributors

SoftInWay Turbomachinery Solutions Pvt. Ltd
Flat No. 301, 3rd Floor, Royal Manor,
70/10, Cunningham Road,
Bangalore-560052
Phone: +91 80 40908191
india@softinway.com

Actual Mechanics
Moskovskiy Avenue 199B, Kharkov, Ukraine
Phone: +38 057 758-1227
ukraine@softinway.com

www.softinway.com

RC #SIWEB0A0FA4