

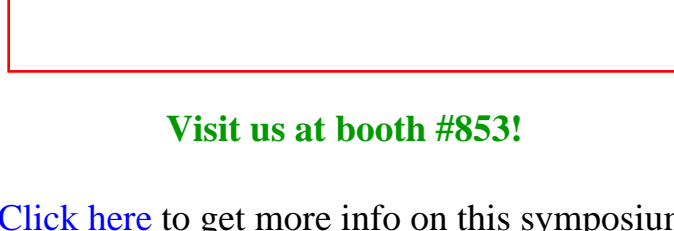
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**SoftInWay Through the Prizm of Events**

**AxSTREAM™ on the Global Gas Turbine Events**

We invite you to meet us at



**Visit us at booth #853!**

[Click here](#) to get more info on this symposium.

There you will see our latest solutions for digital prototyping and turbomachinery design led by our flagship product AxSTREAM™- a professional tool for rapid steam/gas turbine flow path design. SoftInWay's line of products will help you to save time and money by shortening the design cycle, increasing efficiency of your turbines and other power generating equipment, and improving performance in a wide range of operation.

**New Engineering Papers**

**METHODS AND TOOLS OF MULTIDISCIPLINARY OPTIMIZATION OF AXIAL TURBINE STAGES WITH RELATIVELY LONG BLADES**  
 Leonid Moroz, et al, SoftInWay, Inc.

An effective methodology for optimal design of axial turbine blades is presented. It has been used for achieving turbine stage maximal efficiency meeting both stress-strain and vibration reliability requirements and taking into account technology limitations.  
[More>>](#)

**FLOW PHENOMENON IN STEAM TURBINE DISK-STATOR CAVITIES CHANNLED BY BALANCE HOLES**  
 Leonid Moroz, SoftInWay, Inc.  
 Alexander Tarasov, SoftInWay, Inc.

Computational fluid dynamic (CFD) analysis of the secondary flow path region of high pressure steam turbine was conducted. The region includes two adjacent to disc cavities and section of main flow path. The cavities are channeled by balance holes located in the disk.  
[More>>](#)

Both articles were presented at ASME Turbo Show 2004

**Openings in SoftInWay**

We currently invite you to explore the vacancies that the links below are leading to:  
[CAE Software Developer](#)  
[Project Manager, Engineering Consulting](#)  
[Sales Engineer/Project Manager](#)

You will join a strategically focused and highly motivated team involved in Scientific, Mechanical Engineering, Design Consulting and Software Development. You also will have an opportunity to work on multiple projects in a flexible, friendly environment.

**Turbomachinery design with AxSTREAM**

**Design of the 43.3" L-0 stage blades with AxSTREAM™**

Design of steam turbine LP with D/1 ~3 exceeds the bounds of HP/IP design tasks due to great radial dimensions that in turn causes high level of centrifugal loads and tensions in a blade. This leads to emerging a whole complex of contradictory problems and the main is building an aerodynamically perfect flow path providing reliable blade operation under impact of centrifugal forces and dynamic loads of fluid flow.

SoftInWay's technical staff has accumulated a great skill in last stages buckets design for different kinds of turbines. Design of 19MW L-0 43.3" blade is extracted from the last project of a large steam turbine made by our team with the help of AxSTREAM.

[More>>](#)

**AxSTREAM Online Presentation**

**An opportunity to view AxSTREAM™ capabilities in Turbine Design at a glance!**

The presentation gives an overview of AxSTREAM™ software suite capabilities in axial turbines conceptual design and optimization. This presentation features viewer-oriented approach providing a whole specter of unique AxSTREAM™ design and optimization functions from conception to 3D model including the program's theoretical basics that allow to quicker comprehend the core of the program.

[View >>](#)

**Welcome to our Science Club!**

We will be glad to publicize your papers in mechanical engineering in our Science Club. Please submit your articles to [lm@softinway.com](mailto:lm@softinway.com)

There you will find an array of articles authored by our scientists and colleagues from academia dedicated to various aspects of turbomachinery research, design, simulation and modernization, heat transfer, mechanical engineering etc.



[See articles >>](#)

**Turbomachinery design with AxSTREAM**

**DESIGN OF THE 43.3" L-0 STAGE BLADES**

The Design of the Last Stage (L-0) of the steam turbine LP is a compromise between creating the aerodynamically perfect set of blade profiles and making it fitted the requirements of durability and reliability. This takes a large amount of time and efforts, requires high skilled designers and is a real bottleneck of a whole design process.

AxSTREAM™ provides designers with the complex solution of gasdynamic / structural design and optimization for L-0. Additionally, the airfoils profiling / stacking with regard to the stresses caused by the centrifugal forces and aerodynamic loads are performed.

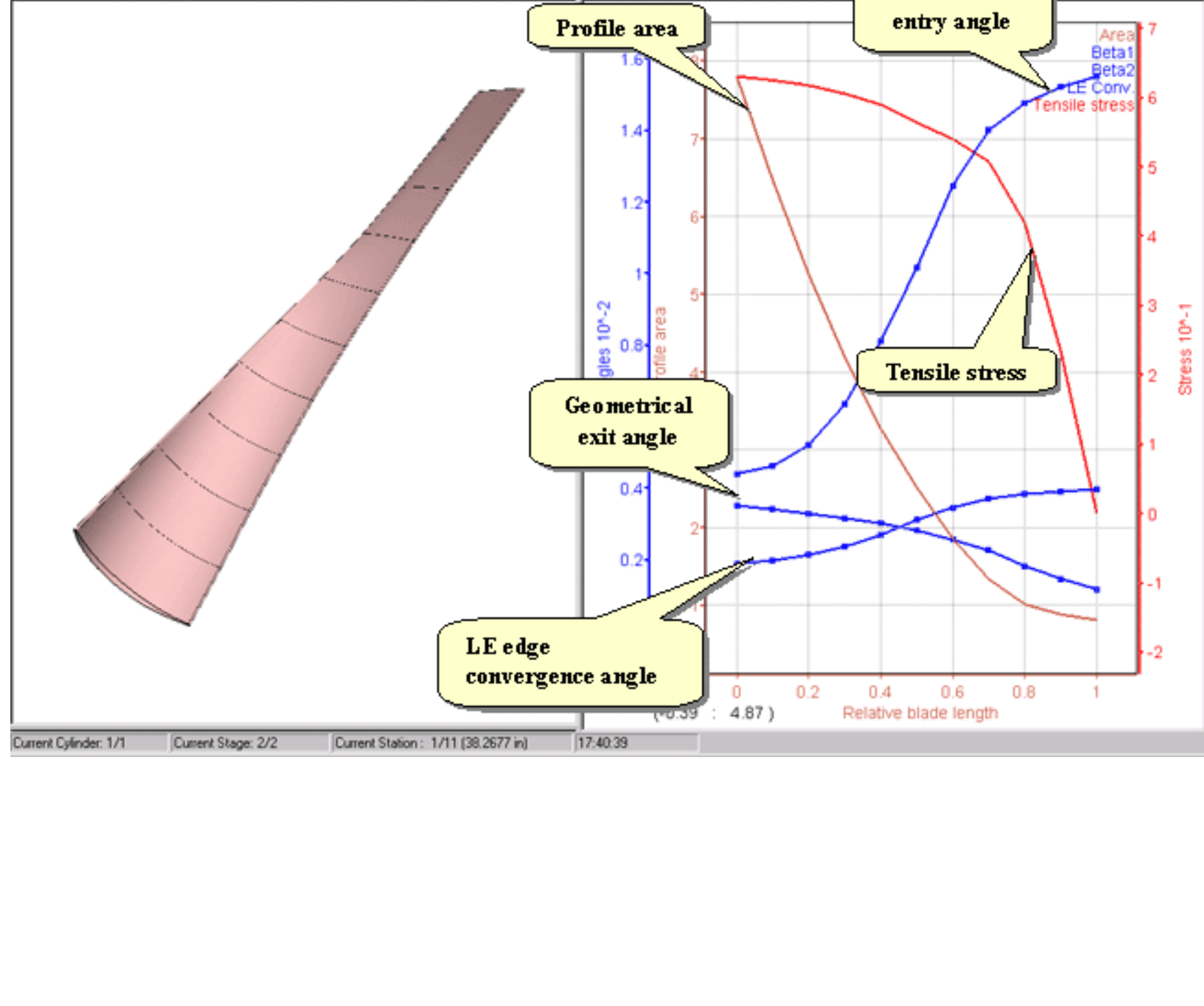
The result of design with AxSTREAM™ is a 3D model of blade surface and geometry representation suitable to immediate building the models for 3D CFD simulation with CFX and FLUENT.

The design capabilities provided by AxSTREAM™ dramatically reduce time consumption for the L-0 stage design.

The link below leads to an example of AxSTREAM™-aided design of the 43.3" blade (D/1 = 2.37) at 3000rpm. The stage power is 19 MW, efficiency - 62 %.

Totally, the design procedure takes near 30 hours. At that, 12 hours have been spent on calculation and optimization of the stage with concern on the flow irregularity along the blade height, while the rest of time was dedicated to the airfoils profiling considering actual flow characteristics, stress distribution and smoothness of the blade surface.

[Download demo of IGES format file of 43.3" LSB](#)



**New Engineering Papers**

**METHODS AND TOOLS OF MULTIDISCIPLINARY OPTIMIZATION OF AXIAL TURBINE STAGES WITH RELATIVELY LONG BLADES**

Leonid Moroz, SoftInWay, Inc.  
 Yuri Govoruschenko, SoftInWay, Inc.  
 Leonid Romanenko, SoftInWay, Inc.  
 Petr Pagur, SoftInWay, Inc.

Problem formulations of the turbine flow path optimization mirror main phases of axial turbines design practice and feature usage of increasingly accurate models ascending design elaboration. As the industry moves forward, integration of 3D modeling of aerodynamic and strength calculations into optimization process excites advanced interest. Usually, such optimization refers to a separate blade row or isolated stage that at comparatively great number of engaged parameters entails enormous time of computations and heightened requirements to computing resources. Nevertheless, 3D models occupy a fitting place along with conventional 1D and 2D numerical ones. At the same time, the MDO optimization problem formulations for any kind of models have a lot of general points and, being evaluated in relatively ordinary tasks, can be successfully applied to more complex problems.

This paper describes a process of optimal flow path design that is achieved through the following steps:

- rapid flow path design and optimization using reduced order models and axisymmetrical solver;
- blade cross-sections profiling according to aerodynamic criteria, blade stacking (3D profiling) with optimized twist/lean;
- generation of parameterized mesh for buckets and parameterized grid for inter-blade passages;
- detailed 3D CFD computations and finite element structural and modal analyses with commercial CFD and FEA tools;
- design optimization using design of experiment (DoE) methods and reduced order models.

Process begins from preliminary flow path design. Tools like AxSTREAM™ allow significantly reduce the search range for bucket optimal configuration. AxSTREAM™ uses stage and airfoil optimizations based on DoE methods in combination with 2D aerodynamic and 1D structural calculations. Computed data can be exported to external tool for mesh and grid generation.

MinuteMesh-Turbo™, a parameterized mesh generator specifically developed for turbomachinery applications can be used as a preprocessor for industry standard CFD modeling and FEA packages.

AxPLAN™ DoE tool makes possible to decrease a number of time-consuming 3D computations by evaluating the response function sensitivity to varied parameters. It also formulates and solves optimization problems, and acts as pre- and post-processor.

Described tools are seamlessly integrated with industry standard 3D CFD modeling and FEA packages and, therefore, can be used by design organizations with minimal changes to established design practices.

[Full article>>](#)

**FLOW PHENOMENON IN STEAM TURBINE DISK-STATOR CAVITIES CHANNLED BY BALANCE HOLES**

Leonid Moroz, SoftInWay, Inc.  
 Alexander Tarasov, SoftInWay, Inc.

Flow in cavities between rotating disk and fixed stator is a subject of many investigations and remains a point of considerable interest due to a variety of disk cavity and rim seal geometries that are explored in current gas and steam turbines. Influence of geometrical details on the flow inside cavity is very strong and therefore slight variations in seal geometries lead to dramatic differences in flow patterns. One of the challenging problems of the secondary flow path modeling is predicting the pump effect caused by rotating disk.

Two geometrical models were considered: single disk cavity and both cavities with balance holes. 2D axisymmetric and 3D analyses were conducted for the first model, however only 3D study was performed for the second one.

Analysis of the single disk cavity has revealed appearance of vortexes in circumferential direction even in a case when all boundary conditions and geometry features were close to the axi-symmetric case. The trend of the average pressure distributions along radius was found for 2D and 3D models.

The transient analysis of the two cavity model revealed vortexes movement in circumferential direction with higher than disk rotation velocity. It induces periodic conditions at the inlet and outlet of balance hole and periodic steam mass flow rate through the holes. The flow pattern in the two cavities with balance holes is so complicated that common 1D net flow representation should be considered as significant simplification.

[Full article>>](#)

**Openings in SoftInWay**

Welcome to join SoftInWay Incorporate! We invite you to explore the vacancies presented below:

**CAE Software Developer**

This individual should have experience in development of complex engineering software projects and a strong background in CAE tools. Excellent understanding of FEA and / or CFD methods and issues. It is essential that the individual has a strong desire to learn and explore new technologies and is able to subordinate good problem solving skills.

Requirements:

- B.Sc., or M.Sc., or Ph.D. in Mechanical Engineering, Applied Math or Physics with respectfully 5+, or 3+ , or 0-1 years of experience in engineering software development (C, C++, FORTRAN);
- Thorough knowledge of FEA and / or CFD methods;
- Hands on experience with at least one of the following tools: ANSYS, MSC.Software, ABAQUS, I-Deas, CATIA, Fluent, or CFX.

**Project Manager, Engineering Consulting**

This individual will be responsible for all-round technical preparation and evaluation of project proposals in FEA-based CFD, Heat Transfer, Stress-Strain areas. Recommending improvements, the project's technical issues coordination including problems' review, sophisticated model description, precise boundary conditions evaluation, and gathering and analysis of other data required for providing further non-stop development process.

Also responsible for building and maintaining development schedules and fulfilling project deliverables on time, from inception to client sign-off. Beyond this, the candidate needs to have very sharp analytical skills, which s/he will use through the project life cycle, including detailed pre-development proposal analysis, projects feasibility estimation, and user requirements analysis.

Requirements:

- Masters Degree or Bachelors in Mechanical Engineering with significant related experience at Power Generation Machinery oriented companies like GE, Pratt & Whitney, Rolls-Royce, Alstom. Computed Science Degree is desirable.
- 5+ years of complex Mechanical Engineering project management, engineering application development, design, and implementation experience.
- Experience in FEA-contained packages' implementation like ANSYS and/or similar toolkits is appreciated.
- Principle knowledge in CFD, Heat Transfer, Stress-Strain, Machine Design is extremely required.
- Must be strongly focused and extremely organized.
- Proven experience in writing specifications, quality assurance, project complexity, labor effort estimation, and risk analysis skills.
- Exceptional oral and written communications skills are essential.
- PMI certification is a plus.

**Sales Engineer/Project Manager**

The essential job function of this person is business development and sales of engineering/software development consulting services including:

- forecast development to achieve national sales goals;
- developing and implementing a strategic sales plan to achieve national sales goals;
- identify, close and maintain key accounts;
- provide information to marketing to improve products and profitability;
- monitor and assess major competitors' activities and products.

The person will perform sales work inside and outside in support of SoftInWay's engineering services for diverse industries including Aerospace, Power Generation, Automotive, Energy, Petrochemical, Utilities, Gas, etc. He/She will prepare proposals or service contracts for SoftInWay's engineering services with deep understanding of customer requirements and company's team Design and Engineering abilities in FEA-based CFD, Heat Transfer, and Structural applications development. Coordinate and schedule marketing activity. Serve as Project Manager for various projects, both temporary and ongoing.

Requirements:

- Minimum 4 year Degree in Mechanical Engineering or related areas with significant related experience at Power Generation Machinery oriented companies like GE, Pratt & Whitney, Rolls-Royce, Alstom.
- 5 - 8 years experience of surpassing sales quotas in selling consulting services to C-level executives in engineering and scientific.
- Principle knowledge in CFD, Heat Transfer, Stress-Strain, Machine Design, CAD/CAE, and Visualization is appreciated. Knowledge of MS Office and MS Project is a plus.
- Excellent prospecting and presentation skills .
- Must be strongly focused and extremely organized.
- Exceptional oral and written communications skills are essential.

**About SoftInWay Corporation**

**SoftInWay, Inc.** is an engineering company headquartered in Burlington, Massachusetts, USA. Company has a sales office in Scottsdale, Arizona, USA. Company's mission is to serve international high technology community by providing high quality engineering services and software products in the area of design and modeling of turbo- thermo- and rotating machinery; and thermal- structural- and fluidic analyses. Company uses its proprietary technologies, and industry standard CFD and FEA tools to address design issues at the earliest possible stage, maximize engineering productivity and increase efficiency of new and retrofitted equipment. Company collaboration with academia, industry, and customers around the world has led to a reputation for constant innovation in the complete design-to-manufacture process.

For more information, visit <http://www.softinway.com> or call 781-685-4942.

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