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From: SoftinWay Inc.

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In a Vanguard of Progressive Technologies

Aspects of Modular Design for Turbomachinery

In a complex process of product design, a progressively greater number of variants preformed within strict budget and time constraints has become one of the most important cost drivers for many development managers, along with design and manufacturing engineers. Introduced here is a SoftinWay's concept of Modular Design (MD) for turbomachinery within the product design platform approach, intended to increase design and engineering efficiency, i.e. company efficiency, while reducing costs and time to market.

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Mirror of SoftinWay's Innovations

SoftinWay Contributes to Innovative Design Technology:

- **AxPlan™** - SoftinWay Offers *AxPLAN™* a Design of Experiments Software More>>

See also on **TesLinks.com** click here

SoftinWay's New Publications

The fresh glance on the old problem of Power Generation Industry

Cost reducing of power plant cycling operation is and always was a headache for power plant management staff. The authors of the paper, Professor A. Leyzerovich, Industry Consultant in Power Generation Industry, and Dr. L. Moroz, SoftinWay's President, offer their own interpretation of the problem providing practice-valued prompts for reducing turbine unit performance deterioration and by this reducing the cost of consequences.

Read More >> in *Energy Pulse* **Weekly**
(Courtesy of CyberTech, Inc)

SoftinWay's Online Presentation

An opportunity to view our abilities in Design and Engineering Consulting at a glance!

The presentation gives an overview of visualized samples of SoftinWay's projects and solutions in different kinds of our consulting services. This presentation featured more viewer-oriented approach with separate sections pertained to a certain kind of activity, now with wide array of rotators and other kinds of machinery.Design applications along with CFD, Heat Transfer, Structural/Thermostructural, Visualization and Software development.

View >>

Openings in SoftinWay

We currently invite you to explore the vacancies that the links below are leading to:

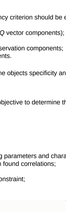
Project Manager, Engineering Consulting

Sales Engineer/Project Manager

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

Welcome to our Science Club!

New Mechanical Engineering Papers!



Latest:

Influence of Heat Sink through Flow Path Metal Components of Steam Turbines HP Cylinder on Intensity of Erosion and Corrosion Processes ...Read>>

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Reversible Electrochemical Cell for Generation of Hydrogen and Electrical Power Read>>

How to Reduce the Cost of Powerplant Cycling Read>>

More articles >>

Mirror of SoftinWay's Innovations

SoftinWay offers AxPlan™ a design of experiments software

Search for an optimal solution of a multi-parametric problem is always computational expensive. For this reason if FEA or CFD modeling is used, the optimization of the design becomes practically unattainable. There is, however, a way to circumvent this difficulty, called Formal Macro-modeling Method (FMM). It allows effectively solve the problem of multi-parametric optimization for resource-hungry simulations. This method seeks an optimum using macro-models instead of the original models, and, therefore, it requires several orders of magnitude fewer computational resources. FMM relies on a set of "black box"simulations (polynomial, for example) with reduced (vs. full model) number of inner relationships. Macro-models can be extracted from results of numerical experiments performed on the original models.

Practical implementation of the FMM consists of the following steps:

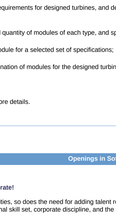
1. Selection (identification) of the Original Mathematical Model (OMM);
2. Selection of efficiency criterion;
3. Determination of such OMM parameters, which influence on the efficiency criterion should be examined, and setting up the Q vector of these parameters;
4. Determination of macro-modeling region (i.e. ranges of variation of the Q vector components);
5. Creation of experiment planning matrix;
6. Running the numerical experiment and evaluation of the *Y* vector of observation components;
7. Processing of the experimental results and fitting macro-model coefficients.

Steps 1- 4 can't be formalized, and their implementation requires knowledge the objects specificity and experience. Steps 5 - 7 can be implemented using ***AxPLAN™*** software.

AxPLAN™ is dedicated to solving scientific and engineering problems with objective to determine the best combination of the parameters that provide high level of performance.

AxPLAN™ makes possible:

- Formulation and planning of experiment;
- Usage of a *priory* known information about correlations between varying parameters and characteristics of the studied object;
- Processing of experiment results and extracting the macro-models from found correlations;
- Macro-modeling of the object characteristics;
- Solving multi-criterion optimization problems including every possible constraint;
- Visualization of topology lines and their interactive examination.



AxPLAN™ carries on experiment planning on the basis of Box-Benken and Rechtschaffner's quadratic plans. Each method has its *pro* and cons. For example, first method has been developed for only a specific (not an arbitrarily) number of independent variables and relatively ample number of experiments is required. Rechtschaffner's experiment planning requires certain pre-calculations, however, in order to obtain the quadratic polynomial form of four independent parameters only 15 numerical experiments are required. At the same time, Box-Benken plan requires 25 experiments for the same case.

AxPLAN™ was verified in a process of complex analysis and optimization of multistage axial turbine flow path with ***AxStream™*** solver. Numerical experiment planning was performed in order to determine relationship between physical parameters of the turbine. Then, the multi-stage turbine aerodynamic analysis was conducted at the selected points. An ultimate optimization was carried out using extracted macro-models.

Please contact ***SoftinWay, Inc.*** for more details.

In a Vanguard of Progressive Technologies

Aspects of Modular Design in Turbomachinery

In a complex process of product design, a progressively greater number of variants *preformed* within strict budget and time constraints has become one of the most important cost drivers for many development managers, along with design and manufacturing engineers. Introduced here is the SoftinWay's concept of Modular Design (MD) for turbomachinery within the product design platform approach, intended to increase design and engineering efficiency, *vs.* company efficiency, while reducing costs and time to market. Applied organizationally, MD benefits include reduced product development lead time, concurrent development of the product and production system, parallel design and manufacturing, improved quality, easier service and upgrading, and reduced material and overhead costs.

The essence of Modular Design (MD).

Generally, MD implies creation of a complex system (such as a large program, an electronic circuit, or a mechanical device) on the basis of pre-designed set of elements (modules). MD allows a team of engineers to independently work on different components of a design and later merge these modules into one complete machine. As applied to turbomachinery, the set can include individual stages (or blade rows), rotors, casing elements, inlet and outlet ducts, separators, fluid distribution units, regulating circuitry and controls, bearings, etc. From economical standpoint, the quantity of types and sizes of every module should be minimized, however the set should be comprehensive enough to avoid noticeable deterioration of operating characteristics of newly designed turbines.

Application area and benefits of MD.

Parallel development saves time and allows for independent timing closure on each module. Modular Design also allows to modify a module while leaving other, more stable modules intact. MD can be successfully used for creation of a wide enough set of analogous turbines with somewhat different specification parameters, such as entry and exit pressure, fluid rate, etc. Having an adequate collection of the pre-designed modules, a designer doesn't start from scratch with every new project and, in fact, achieve quite high level of the turbine performance.

MD saves money in several ways: it clearly reduces engineering and pre-manufacturing (rig fabrication) time; also because only few modules are used, the greater number of these must be manufactured and, therefore, manufacturer is justified to use modern massive production technologies bringing price further down.

If modules have been manufactured in advance, product delivery time will be dramatically shorten, but even if modules are only pre-engineered and stored in the library of components, saving of time is still very significant.

Rational MD

The rational choice of the required set of modules is dictated by the range of variation of initial parameters. The expanded range of specifications can be accommodated by adding new types and sizes of the modules. Another constrain is imposed by available manufacturing capabilities. In any case, designer selects some design parameters (for example, root diameter or peripheral diameter of blade rows) that, in fact, define every stage optimal heat drop. A designer should also resolve the issue of acceptable efficiency losses at extremely unfavorable and at mean deviations of given specifications from specifications the set of modules was designed for. This critically influences a required quantity of similar modules and, therefore, design, manufacture, and storage expenses.

Implementation of rational MD

Each module in a set should be optimally designed to meet chosen specifications. An optimal combination of pre-designed modules is selected for every designed turbine. We apply the following algorithms for implementation of the rational MD method:

- Generalization of typical requirements for designed turbines, and determination of possible variation range for each specification parameter;
- Determination of a rational quantity of modules of each type, and specifications for each size of module of that type;
- Optimal design of each module for a selected set of specifications;
- Selection of optimal combination of modules for the designed turbine taking into account expected range of operational conditions.

Please contact ***SoftinWay, Inc.*** for more details.

Openings in SoftinWay

Welcome to join SoftinWay Incorporate!

As we expand our base of opportunities, so does the need for adding talent resources to support our growth expands. We are always searching for staff additions that have the professional skill set, corporate discipline, and the solution development creativity to match our client's technology challenges.

Since our company was established as a Scientific and Engineering based Outsourcing Service Provider to the global IT and Mechanical Engineering world, the dominant objective of our activity is to provide "Client Specific Solutions." Technical excellence is our committed customer goal. The sharing of this goal is the fundamental core characteristic for anyone seeking a position in SoftinWay.

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

We currently invite you to explore the vacancies presented below:

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 required.
- Principle knowledge in CFD, Heat Transfer, Stress-Strain, Machine Design is extremely appreciated.
- 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.

We will be happy to see you in our team, supported by a whole suite of customary benefits.

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.

Opt-out info