

ARANI

Arani Power Systems Limited

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An ISO 9001:2008 Certified Company

*Steam Turbines, Balance of Plant
&
Services*





- ★ Rapid Customized Designs
that best fits customer requirements
- ★ Enhanced Availability & Reliability
for better commercial benefits
- ★ Superior Designs
adapting to local operating conditions
- ★ Better Efficiency
leading to less fuel consumption & hence eco-friendly
- ★ Reliable and Failsafe Control System
to avoid over-speeding & rotor blade failures
- ★ Full Fledged Mechanical Run Test
to avoid unexpected problems at site
- ★ Easily Accessible Local After Sales Service
avoiding delay in follow-ups
- ★ Faster Stabilization & Ease of Maintenance
resulting in early commercial returns
- ★ Expertise in Troubleshooting
for quicker resolutions
- ★ Shorter Delivery Period
For shorter gestation period



Steam Turbine under assembly

About us...

Arani Power Systems Limited is a formidable force in the field of small and medium capacity Steam Turbine design, development & manufacturing, committed to meet the Turbo-Generator packages for Co-generation, IPP's, CCP's in Sugar, Steel, Cement, Paper, Solar Thermal, Biomass, Textile, Petrochemical, MSW, Distilleries, Rice, WHR and other core sectors including Utility segment. We understand the local operating conditions better and hence have adapted more reliable features in our product range. We provide services like Up-gradation, Up-rating, Life extension, Performance enhancement, Relocation Services, Troubleshooting, Engineering improvements, repairs and Erection & Commissioning by strong and dedicated team. We also supply Spare rotors and replaceable components of turbines.

Arani Power is founded and managed by a group of top notch technocrats, with a wealth of varied experience at the forefront of R&D, Design, Engineering, Manufacturing, Erection & Commissioning, Troubleshooting and After sales service of the steam turbine industry. Arani is an indigenous Original Equipment Manufacturer of 2.5-60 MW Steam Turbines, customized to suit specific requirements, for inlet steam ratings upto 125ata and 540°C



8MW Steam Turbine



Arani Offerings & Value added Services

- ★ Design, Manufacture of Steam Turbines from 2.5-60 MW and Balance of Plant of complete STG island
- ★ Packaged power solutions in the range of 60-150 MW
- ★ Erection & Commissioning
- ★ Application of standardized project solutions wherever possible
- ★ Modular design for Steam Turbines
- ★ Trouble shooting, supply of spares & servicing for all makes of existing turbines
- ★ Refurbishing and Modernization for all makes of turbines
- ★ Up-rating and repairs
- ★ Relocation and life extension of STGs
- ★ Long-term service and maintenance contracts



Casing

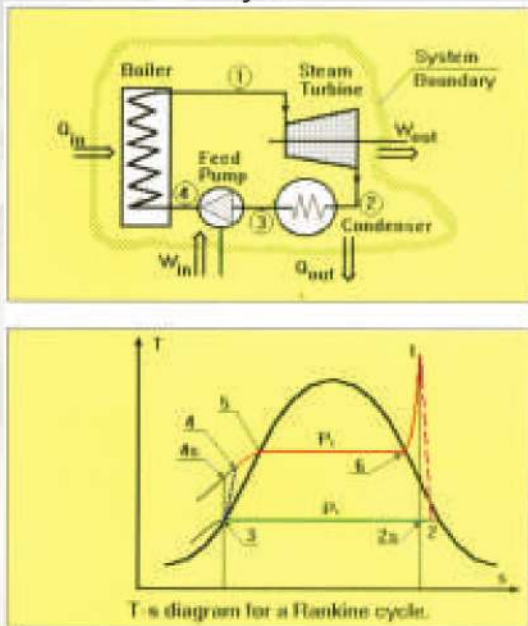


27MW Cogeneration Steam Turbine (Double Controlled Extractions)
under Mechanical Run Test

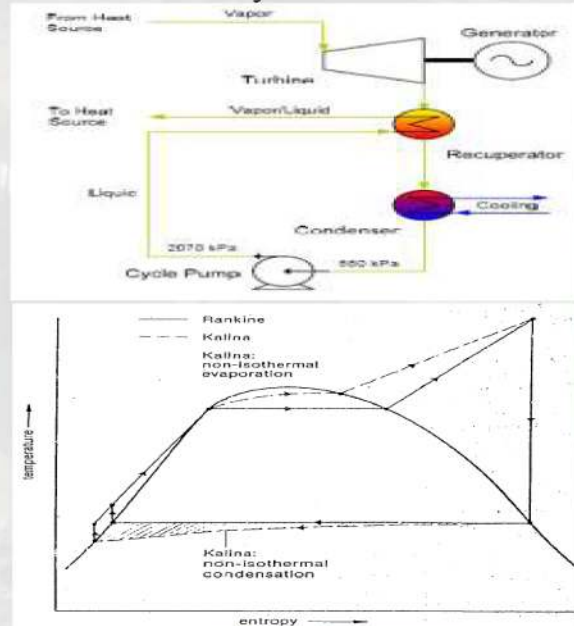
Arani Power Products & Applications

Steam Turbines

Rankine Cycle Schematic



Kalina Cycle Schematic



We design, manufacture and supply the Steam Turbines in compliance with international quality standards like API, IEC with the following objectives

- ★ Develop efficient & reliable designs in line with customer needs
- ★ Adopt latest designs tools for Optimized & Cost effective solutions
- ★ Modular designs to meet short delivery periods
- ★ Customize the existing platforms per customer needs
- ★ Optimize steam path design for new designs and refurbished models
- ★ Reliable designs through high-end analyses like Rotor Dynamics, FEA, CFD, HCF, LCF & Creep

Applications

- ★ Co-generation Plants using extraction condensing steam turbines in sugar, paper, textile, fertilizer and similar industries
- ★ Captive Power Plants using regenerative type condensing steam turbines in cement, mini-steel plants etc.
- ★ Independent Power Plants using straight condensing steam turbines with/without uncontrolled extraction based on renewable energy sources/biomass
- ★ Combined Cycle Power Plants using condensing steam turbines with/without low pressure injections steam, utilizing waste heat recovery from open cycle gas turbine
- ★ Waste heat recovery using low pressure condensing steam turbines
- ★ High Technology Turbines for Kalina Cycle

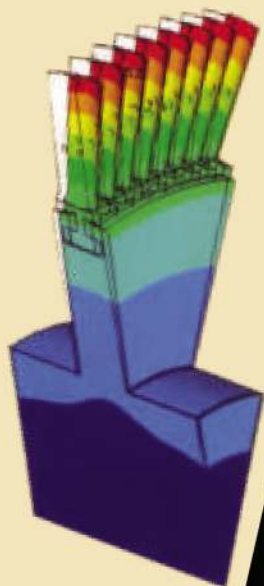


Power ratings

- ★ Power ratings upto 60 MW
- ★ Packaged solutions – Power ratings between 60 to 150 MW (sub & super-critical)

Design Features

- ★ Robust & compact steam turbine designs with Impulse technology for sustained better performance and ease of maintenance
- ★ Efficient customized designs based on the application, with provision of extraction/bleeds for process and heater requirements
- ★ State of the art low pressure stage design with contemporary features like uniform loading from root to tip for all steam flow conditions ensuring minimum dynamic stresses
- ★ Improved Control System using state of the art micro-processor technology with quicker response to avoid over-speed damages
- ★ Shaft Earthing System to prevent pitting on rotor journals & thrust collars
- ★ Auto Gland Sealing System to reduce human intervention and sealing losses
- ★ Package Design for ease of Transportation & Erection
- ★ Sliding bearing pedestal design to avoid misalignments of the rotors
- ★ Reliable control stage design
- ★ Robust diaphragms design to minimize hot deflections



HP Blade Model Analysis



Blades

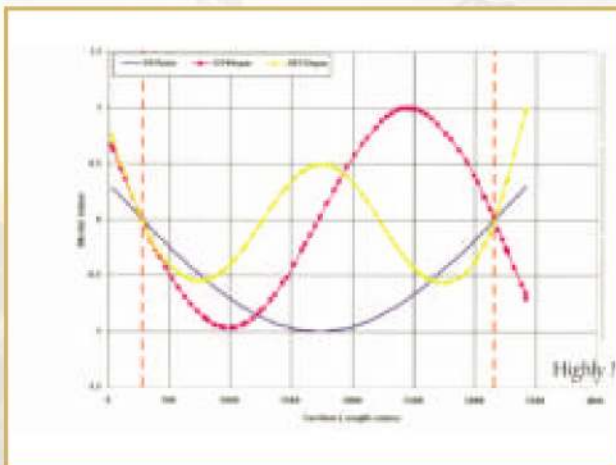
Control System

Salient features of Control System are

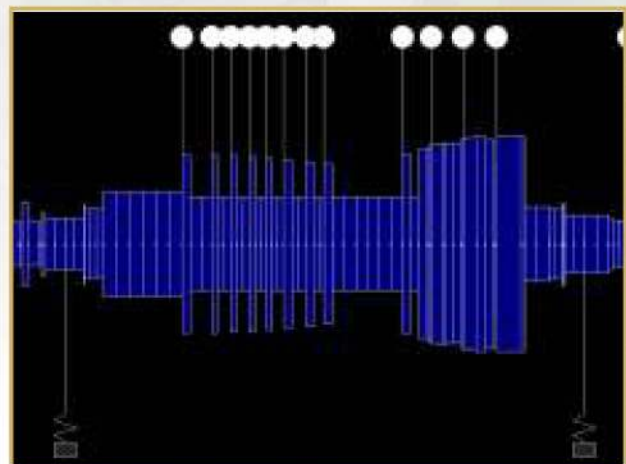
- ★ Remote operation from control room
- ★ Fast response electro-hydraulic emergency stop valve for enhanced safety and reliability of rotor and blades
- ★ Online testing of Emergency Stop Valve against jamming of spindle
- ★ Latest state of the art micro-processor technology for precise turbine speed and load control
- ★ Additional dedicated over-speed trip device with micro-processor based technology, using 2 out of 3 voting logic for unmatched accuracy and reliability

Design Approach

- ★ Adopting Top-down design methodology to effectively control the design activities in concurrent engineering scenario
- ★ Systems analytical & Statistical driven approach
- ★ High –end analyses like fatigue & creep for Damage Tolerant Designs
- ★ Extensive use of finite element techniques for structural analysis
- ★ All our design procedures are in compliance with the highest international codes and standards like API, ANSI, ISO, DIN etc.



Rotor - Mode Shapes



Rotor Dynamics



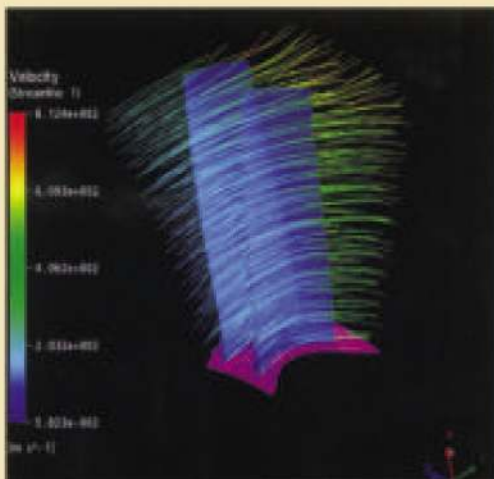
R & D Team

- ★ Our R&D team comprises of cream of experts, who have worked with many global OEM's in design, development, manufacturing and troubleshooting of steam turbines. The team has proven talent in adaptation of designs suitable to Indian scenario. The capabilities of R & D team are
- ★ Demonstrated expertise with modern design methods & tools like computational fluid dynamic analysis, finite element analysis, structural analysis, rotor dynamic analysis, various failure analysis, life estimation and metallurgy of material etc.
- ★ Team supported by vast experienced & demonstrated expertise
- ★ Seamless integration of R & D with other departments
- ★ Continuous improvement of team's skills through training

Technology & Tools

- ★ Aero-profiles modeling codes
- ★ CFD code for developing blades and steam flow path
- ★ Grid meshing codes
- ★ FEA codes for structural analysis
- ★ Solid modeling codes (Pro/E) for Mechanical design & generation of 3D models of components and assemblies
- ★ Codes for unbalance response, stability analysis, torsional and short circuit analysis
- ★ In-house programs (VBA code) for lateral, torsional, blade vibrations & stresses
- ★ MS office as supporting tools
- ★ Windows Server as Operating System
- ★ Totally network integrated work environment

CFD Analysis of Blades





CNC LATHE 6m with
Drilling and Milling attachment



CNC - VTL Machine



Horizontal Boring Machine



CNC Vertical Machining Center

Manufacturing Policy: Steam Turbine manufacturing is quite sophisticated and needs commitment and control over manufacturing processes and enhancement of the same in house. Accordingly Arani's philosophy is to manufacture Rotor, Blades, Casings, Diaphragms and other Critical components in its manufacturing shop itself.

Manufacturing Facilities:

- ★ Manufacturing plant with state of the facilities strategically located in Hyderabad.
- ★ The machinery and equipment procured is a result of continuous research and investment strategy and adopts latest manufacturing technology
- ★ Multi-axis CNS machining centers for precise machining of blades and nozzles
- ★ Dynamic balancing facilities to balance the turbine rotor for highest level of accuracy meeting the international standards like API/VDI/ISO
- ★ A full fledged turbine mechanical run test facility
- ★ In-built quality procedures in all the machining/testing processes

Balance of Plant Equipment for TG Island

Arani Power Systems Limited supplies Turbo-Generator packages consisting of Steam Turbines, Generators, Gear-boxes, Condensers, Heat exchangers, Ejectors, Lube Oil System etc., which comply with various national/international standards, procured from reputed business partners. Seamless integration of the auxiliaries is done by Arani Power Systems Ltd.

Customer Care Services

Our customer care services starts from advising & counseling for proper selection of the equipment to meet the specific requirements, supporting in erection & commissioning and life-time association with customer for their requirements like spare components, overhauls, upgradations, re-powering/refurbished, to meet operating/modified/updated/ life extension requirements.

- ★ We offer consulting customer services, assistance, and provide spare parts quickly to satisfy customer requirements before, during and after the sale
- ★ Offers 24X7 customer support/service aiming for rapid solution of problems, Life-time services to Arani Power supplied-products
- ★ All critical spares are stocked for immediate dispatch to the customer for improved turbine availability
- ★ Enhanced Access Channels for customer convenience to report problems through telephone, email etc.
- ★ Improvements of the product will be informed to the customers for upgrading their units to ensure extended life and trouble free operation



Procurement & QMS

Procurement Strategy

- ★ Critical components/materials are procured inline with purchase specification of APSL, which meet international quality requirements
- ★ Critical components/materials are checked at suppliers work by third party/APSL representatives
- ★ Our vendors are constantly evaluated and the list is updated dynamically based on quality and delivery parameters
- ★ Our vendor development department constantly endeavors to improve the performance of the existing vendors and locate new alternate vendors
- ★ All critical components like casing, rotor, blading material etc., will undergo thorough in-house inspection and non-destructive testing like ultrasonic, X-ray MPI, etc., and the results are cross-verified by third party agency
- ★ The pressure parts are subjected to hydraulic pressure tests to be consistent with APSL/international standards
- ★ After the mechanical run tests of the turbine, the components are strip open and physically inspected. Before dispatch the components are applied with preservatives. The external surfaces are painted to APSL standards/ specific customer choice.
- ★ The culture and quality procedures of APSL ensure consistency in quality & performance

Quality Management Systems

Arani Power Systems Limited is an ISO 9001 :2008 certified company having quality management systems and guidelines in order to give full value addition to the customers with respect to customer relationship management and information security management systems. Our quality manual has been aligned to meet the requirements of following international standards

- ★ ISO 14001 Environmental Management System
- ★ ISO 18001 Health & Safety Management System
- ★ ISO 20000 Customer Relationship Management
- ★ ISO 27000 Information Security Management System

Quality Assurance in Manufacture shop:

- ★ NDT tests on critical components are repeated in shop before releasing for manufacturing.
- ★ All alloying materials are attested before issuing for manufacturing
- ★ Pressure components like Casings, Valve chests, and exhaust casings are tested hydraulically to international and standards like API 612, IEC 45, NEEMA etc for integrity and sealing tightness.
- ★ All blades after manufacturing undergo crack detection test using MPI.
- ★ All that components like blades, valve cones, valve spindle, parting plane bolts etc undergo material composition test using portable machines to avoid mix up of raw material.
- ★ Governing system undergoes functional test.
- ★ The Steam Turbine itself undergoes Mechanical Run Test with fully established facility that includes Boilers, Condensing System, Lube and Control system to prove dynamic behavior with respect to shaft vibrations, bearing temperature etc., It ensures avoidance of last minute surprises and danger with respect to clearances, vibrations, bearing temperatures etc. at site.

Vision

To be a global player in energy sector with environment friendly products.

Mission

- ★ To develop cost effective, efficient and environment friendly products
- ★ To keep up the state of art manufacturing facilities
- ★ To optimise material and manufacturing cost
- ★ To continually upgrade man power skills
- ★ To continually improve the processes and systems to attain high quality and customer satisfaction

Values

- ★ Integrity and fairness in all aspects
- ★ Focus on technical requirements with customer centric
- ★ Treat the suppliers and sub contractors as your business partners
- ★ Be conscious about safety of employees and environment
- ★ Loyalty and pride in working



CNC Vertical Machining Center



Horizontal Floor Borer



Vertical Turret Lathe



Quality Policy

Customer Delight is our aim

Arani Power Systems is engaged in Design, Develop, Manufacture and Commissioning of Steam Turbines.

In line with our Vision, Mission and Core Values, we are committed to enhance customer satisfaction and achieve sustainable growth through :

- ★ Design, Develop, Manufacture and Supply of Defect-Free, Reliable and Customized products to the satisfaction of customers,
- ★ Continual improvement in all facets through infrastructure upgradation and practicing management systems, and
- ★ Inculcation of Total Quality culture at all levels of Arani Power Systems.



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