radial-outflow-turbine-higher-efficiency-turbine-generator-system 1800rpm-3600rpm-

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608-238-6001 [TEL]

greg@infinityturbine.com [Email]

Infinity Turbine LLC

Radial Outflow Turbine ROT ORC

This webpage QR code

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Company Name: Infinity Turbine LLC
Product: Radial Outflow Turbine
Working Fluid: Air, Refrigerants, water, and CO_2
Machine: ORC and ROT Radial Outflow Turbine System
Industry: Energy
Applications: Waste heat to power, utilities, server farms, bitcoin mining, hot geothermal, pumping
High Technology Uses: Converting waste heat to power starting at 30C.
Machine Features: One moving part and solid state turbine technology.
Machine Runs On: Compressed air, refrigerants, CO_2 and reversed can pump the same.
Other Technology: Tribo effect power, hydrodynamic cavitation hot water power and extraction. Modular block technology. Gas leverage turbine for production of fuels from liquid CO_2.

PDF Version of the webpage (first pages)

https://infinityturbine.com/radial-outflow-turbine-higher-efficiency-turbine-generator-system1800rpm-3600rpm-from-infinity-turbine.html

Radial Outflow Turbine

In a radial outflow turbine the organic fluid enters the disk axially in its center and expands radially through a series of stages mounted on the single disk.
At the discharge of the last rotor row the flow passes through a radial diffuser and is then conveyed to the recuperator and or condensation section of the system, through the discharge volute.

In the early 20th century, Parsons Siemens and Ljungstrom developed the first steam based radial outflow turbines. These early model turbines required a large number of stages.

For very high enthalpy drop fluids, such as steam, a single-disk/multi stage configuration was therefore deemed not suitable due to the very large diameter disk necessary to accommodate all the required stages.

No further development of the radial outflow turbines occurred, as they were phased out for steam applications by axial turbines.

But with newer refrigerants as working fluids, they have seen a reemergence.

The Geothermal Radial Outflow Turbine:

An innovative turbine configuration for geothermal applica- tions was developed by the Italian turbine manufacturer EXERGY. The technology, known as the organic radial outflow turbine was designed, engineered, manufactured and tested in Italy. A 1 MWe geothermal organic Rankine cycle (ORC) equipped with the EXERGY radial outflow turbine has been in operation since early 2013. The radial outflow turbine is a new type of turbine that have the potential to increase the geothermal binary power plants ef- ficiency by increasing the turbine efficiency. The operational results has been positive and demonstrates the viability of the technology and the possibility to develop it for bigger sizes.

1/22/2025

Preliminary Design and Off-Design Analysis of a Radial Outflow Turbine for Organic Rankine Cycles:

Recently, the advantages of radial outflow turbines have been outstanding in various operating conditions of the organic Rankine cycle. However, there are only a few studies of such turbines, and information on the design procedure is insufficient. The turbine target performance could be achieved by fine-tuning the blade angle of the nozzle exit. In addition, performance evaluation of the turbine against off-design conditions was performed. Ranges of velocity ratio, loading coefficient, and flow coefficient that can expect high efficiency were proposed through the off-design analysis of the turbine.

1/22/2025

Study on applicability of radial-outflow turbine type for 3 MW WHR organic Rankine cycle:

The article presents the results of study on the reasonability of using radial-outflow turbines in ORC. Peculiarities of radial-outflow turbine design utilizing modern design technologies and application to ORC was considered in the first part of the paper. For this particular cycle design, turbines of radial-outflow type were chosen. Their application enables the increase of mechanical output power by 11 percent compared to original radial-inflow turbines.

1/22/2025

LOSS GENERATION IN RADIAL OUTFLOW STEAM TURBINE CASCADES:

Small high-speed technology based radial outflow steam turbines are characterised by ultra-low aspect ratios, which can lead to rapidly growing secondary losses. The prelimi- nary evaluation of turbine performance is usually based on axial turbine loss predictions, which can be a source of error. The main objectives of this work are to find out how the losses are generated in radial outflow turbines when the aspect ratio is markedly below unity and how accurately axial turbine loss models can predict the trends. To achieve these objectives, a radial outflow turbine cascade having a blade shape and aspect ratios comparable with a prototype machine is examined. As a result of the study, it is suggested that for the examined radial outflow cascade the axial turbine loss correlations can predict the trends reasonably well. The rapidly increasing secondary losses are connected to the merging of secondary structures and also incidence at off-design.

1/22/2025

PRELIMINARY DESIGN OF RADIAL-INFLOW TURBINES FOR ORGANIC RANKINE CYCLE POWER SYSTEMS CONSIDERING PERFORMANCE AND MANUFACTURABILITY ASPECTS:

In order to make organic Rankine cycle power systems economically feasible, it is essential to find a reasonable trade-off between the performance and the initial cost of system. In order to show its relevance in a practical application, the method is applied to two radial-inflow turbines cases: a state-of-the-art turbine using air and a turbine using the working fluid Novec 649 for a heat recovery application. The results indicate that there exists a trade-off between turbine performance and manufacturability, and that it is possible to develop turbine solutions with similar values of efficiency with improved manufacturability indicator by up to 14 to 15 percent.

1/22/2025

DESIGN AND FLOW ANALYSIS OF RADIAL AND MIXED FLOW TURBINE VOLUTES:

Radial and mixed flow turbines which are an important component of a turbocharger consist essentially of a volute, a rotor and a diffuser. Vaneless volute turbines, which have reasonable performance and low cost, are the most used in turbochargers for automotive engines. Care has to be done in the design of the volute, whose function is to convert a part of the engine exhaust gas energy into kinetic energy and direct the flow towards the rotor inlet at an appropriate flow angle with reduced losses.

An Exploration of Radial Flow on a Rotating Blade in Retreating Blade Stall:

The nature of radial flow during retreating blade stall on a two-bladed teetering rotor with cyclic pitch variation is investigated using laser sheet visualization and particle image velocimetry in a low-speed wind tunnel. The velocity field above the retreating blade at 270 degree azimuth shows the expected development of a radially directed jet layer close to the blade surface in the otherwise separated flow region. This jet is observed to break up into discrete structures, limiting the spanwise growth of the radial velocity in the jet layer. The discrete structures are shown to derive their vorticity from the radial jet layer near the surface, rather than from the freestream at the edge of the separated region. The separation line determined using velocity data shows the expected spanwise variation. The results of this study are also correlated in a limited range of extrapolation to the phenomena encountered on a full-scale horizontal axis wind turbine in yaw.

1/22/2025

Publications for Radial Outflow Turbine:

List of selected Radial Outflow Turbine publications.

Publications for Waste Heat to Energy:

List of selected waste heat to energy publications.