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1-megawatt-radial-outflow-turbine-rot-orc-by-infinity-turbine

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Infinity Turbine LLC

1MW ROT Radial Outflow Turbine ROT ORC

This webpage QR code

Structured Data

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Company Name: Infinity Turbine LLC
Product: 1 MW Turbine Generator Assembly
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Working Pressure: Less than 300 psi.
Certification: Experimental. Not ASME certified as is.
Drawings Provided: As is.
Machine: ORC and ROT Radial Outflow Turbine System
Industry: Renewable Energy
Applications: Waste heat to power, utilities, server farms, bitcoin mining, hot geothermal.
High Technology Uses: Converting waste heat to power.
Machine Features: One moving part.
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PDF Version of the webpage (first pages)

Radial Outflow Turbine 1MW AC Generator Hermetically Sealed

Infinity Turbine now has a megawatt-class ORC radial outflow concept turbine.

Multiple turbine generators are stacked in standard hi-cube shipping containers for the 3 MW Power Pack.

These run on heat from 90-160 C. Sources include industrial heat, solar thermal, engine heat, geothermal, and more.

Revenue based on gross sales or savings, not including cost of acquiring waste heat flow or pumps.

Revenue from 1 MW (24 hours x 365 days per year x 1000 kWh = 8,760,000 kWh per year):
at $.20 per kWh = $1,752,000 USD per year
at $.40 per kWh = $3,504,000 USD per year
at $.80 per kWh = $7,008,000 USD per year

Revenue from 3 MW (24 hours x 365 days per year x 3000 kWh = 26,280,000 kWh per year):
at $.20 per kWh = $5,256,000 USD per year
at $.40 per kWh = $10,512,000 USD per year
at $.80 per kWh = $21,024,000 USD per year

Revenue from 6 MW (24 hours x 365 days per year x 1000 kWh = 8,760,000 kWh per year):
at $.20 per kWh = $10,500,000 USD per year
at $.40 per kWh = $21,000,000 USD per year
at $.80 per kWh = $42,000,000 USD per year

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Radial Outflow Turbine 1MW AC Generator Hermetically Sealed

Using a scaled up version of existing ROT technology, this design may produce 1 megawatt of power. Turbine would operate at full load speed of 3600 rpm. Turbine is direct mounted to an induction generator (2-pole). Due to the large size of the generator, it is likely a higher voltage than typical (2400V+) and would probably need to be direct grid connect because grid tie controllers cannot be found in this size or voltage. Size of generator likely to be 31in OD and needs a custom cast iron housing for direct refrigerant cooling.
Construction of plates and turbine are possible using current manufacturing capabilities. Large cast iron housings are likely to be outsourced to a vendor (several available). Generator may be an induction motor from a chiller motor supplier (operating in reverse) if no generator suppliers can be found.

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Bearings

Bearings are oil lubricated and use lip seals to keep the oil separated from refrigerant system.

Working Pressure 200 PSIG

Design Working Pressure is to be 200 psig and refrigerant is to be R245fa.

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Heat Exchanger Design Requirements

Heat exchanger design should be 212F (evap water in), 95F (condenser water in), 20 F ranges and 20 F approaches. This requires 125 lbm/s refrigerant flow and provides 10 percent system efficiency (Evap heat = 30,000,000 Btu/hr). Oversize the condenser for better cooling. To save on manufacturing, make both evaporator and condenser same size to take advantage of economies of scale.
Turbine is dual sided ROT with 3 stages (4.5 inch blade heights per side). Overall Diameter is 24in.
Designed to produce 1MW output

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Dimensions of Turbine Assembly and Rotors

Overall turbine generator housing assembly dimensions are 74 inches (1880 mm) in length.
Overall frontal area is 46 inches (1168 mm) by 37 inches (940 mm).
Turbine Blade Height: 4.5 inches (114 mm)
Turbine Rotor Diameter: 24 inches (609.6)
Turbine Blades Manufacturing: CNC or may be 3D metal printed with slotted fastened rotor disc attachment. There are also waterjet stacking layer options to reduce machining time significantly.
Spin: 3,600 RPM
Generator: 2 pole
2,400 V +
Generator Diameter: 31 inches diameter (787 mm)
Generator Type: Induction or Synchronous
Bearings: Oil lubricated lip seals to keep refrigerant separate from refrigerant (working fluid) in the system.

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