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New Power Generation Technology - Disruptive Fast Track Development - Supercritical CO2 Turbine

http://www.infinityturbine.com

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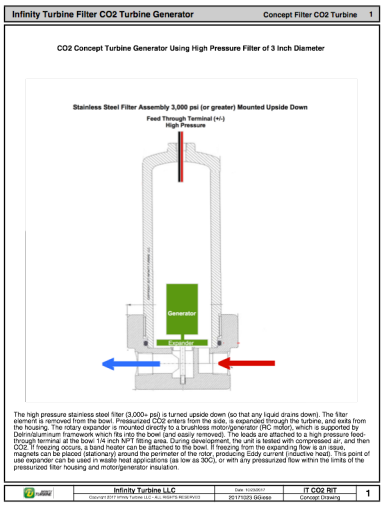
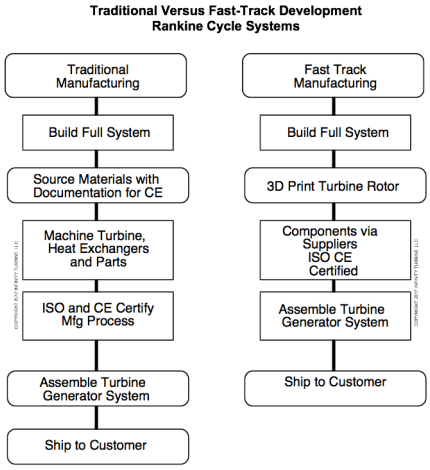
Developing Power Generation Technology For Low Grade Waste Heat Above 31 C or 89 F

Utilizing low grade waste heat with supercritical CO2 is a Pandora's Box for developers, mainly because of the high pressures involved. High pressure means expensive engineering and components. The best methodology is to develop smaller working CO2 turbine prototypes, and learn lessons on a small scale, with less costly results. Infinity has developed a platform to do this prototyping, using a modular cart, high pressure components, and a turbine that fits in a off-the-shelf high pressure filter housing.



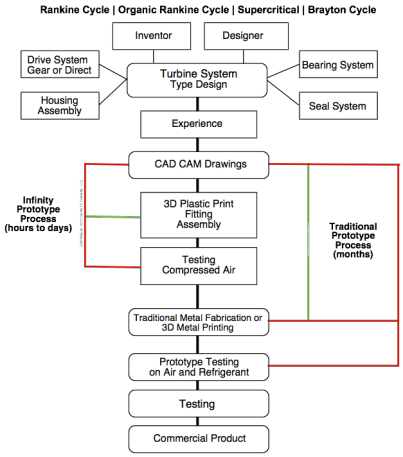
Traditional Versus Fast Track Development

Traditional steam turbine development was slow and expensive. Conventional turbine development today may involve computational flow, CAD/CAM, and other tools which reduce development time, however there is still a trial-and-error testing period. Our methodology is to use 3D printing to decrease the testing period by first doing a plastic print to test on air and parts fitting, then do a metal 3D print, or more conventional vertical milling or waterjet machining for the turbine rotor, stator, and housing parts.



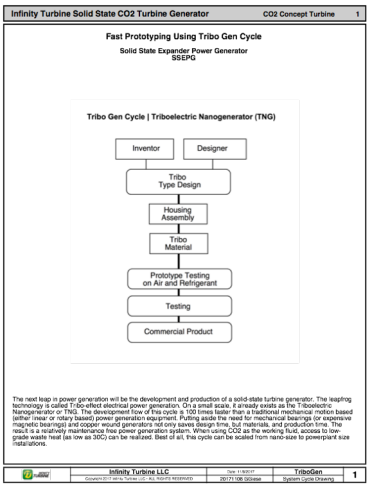
3D Turbine Generator Development

Using a 3D printer can greatly reduce the time to machine and test turbine designs. There are limitations with designs over 3 inches for metal 3D prints however. We've found that our prints using a ExOne metal additive system resultings in poor tolerance, from the shrinking of the metal during the sintering phase (heat curing oven). With a six inch and above rotor, we have found that additional post processing needs to be included for balancing the rotor, or finish.



Solid State Turbine

Retrospective of steam, rankine, organic, and supercritical cycles, the Holy Grail of prime movers would be a static turbine, with no moving parts. The cost and maintenance reduction, would then move the price point to such a level which would make power more affordable on any scale. To that end, Infinity is developing a method to generate electrostatic electricity, from the expansion of CO2 (which goes supercritical at 31 C or 89 F). This proess would reduce the footprint and costs by 100 times.



What Does the Future Hold ?

Converting low grade waste heat to power allows for point-of-use power generation, and access to solar thermal, geothermal, industrial waste heat, and computer server waste heat. The ability to utilize the waste heat in a solid-state turbine, with no moving parts will allow cost-effective power generation at any scale.

More information on Supercritical CO2 energy can be found at the Sandia website: http://energy.sandia.gov/energy/renewable-energy/supercritical-co2/