# PEREGRINE TURBOPUMP ENGINE CORE

What it does

The turbopump is the heart of the engine. It provides the motive force that moves the fluid through the system. It is a 450-horsepower turbine, driving a two-stage compressor. It pushes over 12 pounds of Carbon Dioxide per second through the pipes at a pressure that is 200x the pressure inside an automobile tire.

Problem it solves

The high performance of the turbopump is one of the enabling factors in achieving world record efficiency and specific power.
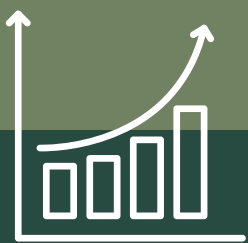
Compared to current technology

Peregrine's unique cartridge style design is transformational in the fact that it enables field maintenance of the core of the engine in hours rather than days.

PEREGRINE POWER TURBINE

What it does

The Power Turbine converts the thermodynamic energy imparted by the turbopump to the flow into electric power by means of a high-speed generator.

Problem it solves

The generator rotates at more than ten times the redline speed of an automobile engine (tachometer image would help illustrate). The high-speed results in a compact design, much smaller than a conventional generator of the same power rating. Much like the high-performance characteristics of the turbopump this also enables the extremely high efficiency of the Peregrine Turbine Engine.
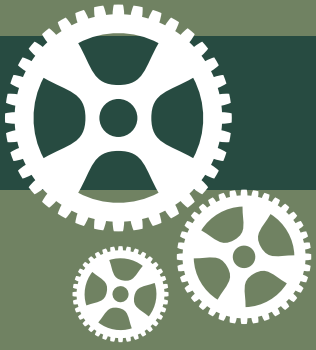
Compared to current technology

Because of the small size the turbogenerator can be operated in a hermetically sealed environment. This eliminates the shaft seal commonly used in designs by others which has been a significant point of failure and results in a continuous leakage to the environment.

PEREGRINE HX ASSEMBLIES

What it does

Peregrine's proprietary **printed circuit heat exchanger (PCH)** heat exchanger design not only outperforms designs by others but is uniquely capable of withstanding the extremely high pressures generated by the system. Its patented features are designed to reduce stress during operation and therefore enhance field life and durability.

Problem it solves

Other heat exchangers experience fatigue-cracking and failure in the field causing operators expensive downtime and support costs. The durability of the Peregrine Turbine mitigates these problems and enables a minimum of 20 years' service life.
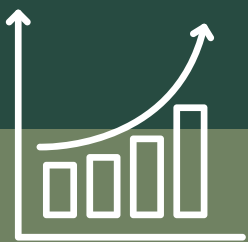
Compared to current technology

Peregrine's design incorporates compliance features that allow the system to flex and move with varying temperature conditions without overly straining the metal.

PERMANENT MAGNET GENERATOR

What it does

The permanent magnet generator uses a carbon-fiber-wound magnet to generate the rotating magnetic field. The carbon fiber enables the magnet to spin at very high speeds which otherwise would result in the magnet coming apart. High speed of rotation enables the high-efficiency that is characteristic of our overall machine.

Problem it solves

Normally a power source is required in a generator prior to start in order to generate the initial magnetic field. The permanent magnet eliminates that need and enables black-start capability.

Compared to current technology

Few manufacturers can make a generator capable of running at the speeds required for an sCO2 machine without a gearbox speed reducer. Our Swiss-made generator eliminates the need for the gearbox and hence another element of the machine that would otherwise require an oil lubrication system. The Peregrine Turbine is an oil-free machine.

FUEL AGNOSTIC

What it does

The Peregrine sCO2 power conversions systems can operate for any high quality air-combustible fuel or heat source including:
- Natural Gas/Hydrogen
- Small Modular Nuclear
- CSP

Problem it solves

The mix of, access to, and cost of fuels and heat sources that are available for power conversion and generation vary substantially with the geography of intended application (a countries natural resources).

This cost efficient, accessible opportunity fuels are a major factor in providing access to dependable clean energy.

Compared to current technology

There is no known technology that can efficiently convert all fuel sources to electric power. The Peregrine Turbine is the first that can do it at breakthrough efficiency.