

Case study

ORC Turbine Generator

Project Summary

Project: Synchronous generator for an ORC turbine

Application: Glass mill waste heat-to-power system

Nidec's Role

Nidec Industrial Solutions was selected to supply a synchronous generator for an ORC turbine that turns waste heat into energy at a glass mill in Bulgaria.

Scope of Supply

- 1 – GSCR 800 Y 2
- Power: 5.5 MVA 6.5 MVA
- Voltage: 6 kV 6.3 kV
- Frequency: 50 Hz
- Speed: 3,000 r/min
- Type of execution. ExnA IIA T3



The challenge:

To produce an engineered-to-order generator for an ORC turbine that turns waste heat into a low-cost, robust source of renewable energy

Many heavy industrial manufacturers are seeking efficient, clean and reliable ways to produce electricity using waste heat from their processes. Some are choosing Organic Rankine Cycle (ORC) turbine technology, which uses a process similar to a steam turbine, except that it vaporizes organic fluids, rather than water. That allows the ORC turbine to extract energy from lower temperature sources. This technology is particularly well-suited for geothermal, biomass and heat recovery systems used in cement, steel and glass manufacturing.

An OEM was seeking to streamline and improve the efficiency of its ORC turbine solution for a glass mill. It contracted Nidec Industrial Solutions to custom-engineer a synchronous generator to meet its operating specifications.

The solution: A 2-pole synchronous generator coupled with the ORC turbine

ORC turbines are usually paired with 4-pole generators equipped with gearboxes for these applications. Desiring a more compact and efficient system, the OEM asked Nidec to engineer a 2-pole generator that would not require a gearbox. Nidec responded by designing a 2-pole synchronous generator to match turbine performance. The generator couples directly to the turbine to offer a more robust and efficient solution than the traditional configuration, resulting in lower life cycle costs, a smaller footprint, less maintenance and greater plant reliability.

The plant today produces 5 MWe of electricity per year with annual savings of approximately 20,000 tons of greenhouse gases. Since its completion, Nidec has partnered with the OEM to create a complete line of ORC turbine generators for plants supplied to the Turkish market.