

High-performance Turbine Technology

Dr. Bumseog Choi/Dr. Hyungsoo Im
Department of Energy Conversion Systems
T. +82 - 42 - 868 - 7286
E. bschoi@kimm.re.kr / limbo999@kimm.re.kr



- Turbine technology for power generation using unutilized energy (waste heat and renewable energy, etc.)
- Gas turbine (UMGT, MGT, GT) technology development

Client / Market

- Power plant turbine manufacturers using waste heat and renewable energy
- Military and industrial aircraft turbine manufacturers
- Gas turbine companies

Necessity of this Technology

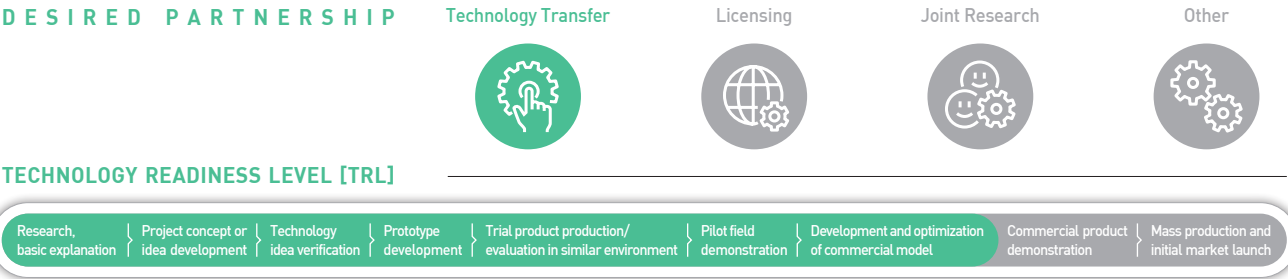
- This technology requires multiple technologies from various fields and extensive research experiences for product development. (design: aerodynamics, structure, rotordynamics, heat transfer/manufacturing & test: material selection, manufacturing management, assembly, performance test)
- There are continued demands for turbine development to utilize in new fields, and technologies derived from the turbine technology can be used to various applications in related industries.
- The turbine technology of KIMM gas competitiveness to global leaders in power generation field utilizing the waste heat and renewable energy.

Technical Differentiation

- Equipped with total solutions of turbine design technology (aerodynamics, structure, cooling, rotordynamics, mechanical design) to satisfy the target performance under various operating conditions
- Equipped with the secondary flow management technology to keep stabile operation of the turbine under high temperature, high pressure, and high speed conditions
- Equipped with turbine operation technology at design and off-design points
- Miniaturization of turbine size and weight is possible depending on the requirement of applications. The technology can be applied to generate high quality energy from typical energy sources (e.g. ultra micro gas turbine, ocean thermal energy conversion turbine, etc.)

Excellence of Technology

- ORC (organic Rankine cycle) turbine for waste heat recovery power generation: The 200 kW ORC turbine prototype for power generation was developed by using own domestic technology, and Korea became the 4th country in the world having the midsize-class ORC technology. Field tests using actual waste heat were conducted



- at two domestic sites, and the performance test results showed thermal efficiency over 10%, which proved world's top-class technology.
- Ocean thermal energy conversion (OTEC) turbine: The first 20 kW OTEC turbine in Korea was developed. The target performance was obtained in the verification test using deep sea water (Deep Seawater Center, Goseong, Gangwon-do)
 - Ultra micro gas turbine (UMGT): The test result of the ultra-microturbine generator of KIMM was the first report in the world for below 1 kW class. UMGT technology of KIMM using liquid fuel is world-first and has world-top level.
 - Turbine for supercritical CO₂ generation: A drive turbine driving CO₂ pump and power turbine for supercritical 200 kW CO₂ power system in Korea were developed for the first time.

Current Intellectual Property Right Status

- PATENT
- Gas Turbine Blade (KR2016-0061918)
 - Self-driven Testing Apparatus (KR1501007)
 - Turbine for Organic Ranking Cycle (KR1332632)
 - Gas Turbine Testing Apparatus and Testing Method Using Thereof (KR1757986)
 - Ultra Micro Gas Turbine with Thermal Stress Damage Prevention Design (KR1634876)
 - Ultra Micro Gas Turbine with Bearing Cooling Part (KR1634875) and 14 other patents

- KNOW-HOW
- Gas turbine (UMGT, MGT, GT) aerodynamic design, thermal stress analysis, and turbine stabilization technology
 - Waste heat recovery power generation turbine (ORC, SORC, OTEC, SCO₂) aerodynamic design and thermal stress analysis technology
 - High-performance turbine system mapping technology
 - High-performance turbine component production, tolerance management, assembly technology
 - High-performance turbine performance test and analysis technology

[Note] ORC: Organic Rankine Cycle / SORC: Super Critical Organic Rankine Cycle
OTEC: Ocean Thermal Energy Conversion / SCO₂: Super Critical CO₂
UMGT: Ultra Micro Gas Turbine / MGT: Micro Gas Turbine