

# IMPACT OF ORC MICRO-TURBINE FLOWPATH OPTIMISATION ON THE OFF-DESIGN PERFORMANCE

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## ABSTRACT

The optimisation of power systems enables their efficiency to be increased, with a consequent increase in the mechanical and electric power generated by the components. For ORC systems, in which cycle efficiency is relatively low (up to 30%)[1–4], designing a high efficiency system increases the competitiveness of the entire undertaking.

In this article, a single-criterion rotor geometry optimisation method is presented for a 10 kWe axial micro-turbine operating in an ORC system. Calculations were performed using deterministic, stochastic and hybrid algorithms. Isentropic efficiency was defined as the objective function. Single channel calculations were performed using a Matlab application and commercial simulation code.

This paper presents a rotor blade, hub and shroud shapes parametrisation method. The quantitative and qualitative results are listed for the optimisation algorithms used. Micro-turbine characteristic measurements were determined. A micro-turbine operation analysis was conducted under off-design conditions, before and after optimisation. As a result of the optimisation process, micro-turbine efficiency was increased and the types of losses showing the most impact on geometric improvement were identified.

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