

# **A new approach for optimum selection of turbocharger using genetic algorithm**

**Sepehr Sanaye<sup>1\*</sup>, Shahram Sedghi Ghadikolaee<sup>1)</sup>, Mohammad Mehdi Ghasemi<sup>1)</sup> and Golandam Rahimi<sup>1)</sup>**

<sup>1)</sup>School of Mechanical Engineering, Iran University of Science and Technology, Tehran, Iran

## **Abstract**

A new method of selecting an optimum turbocharger for a specific engine using thermodynamic and turbomachinery analyses is presented in this paper. The optimum turbocharger was selected for enhancing engine power output by minimising an objective function (the sum of compressor and turbine losses). Constraints in the optimisation process were locating the turbocharged engine operating points at proper position on the compressor map (with sufficient distance from surge and choke lines) as well as satisfying a few parameter values. Design parameters in the optimisation procedure were geometric and aerodynamic parameters of compressor and turbine. The proposed method was used to specify the geometry of an optimum turbocharger for an engine (OM 457 LA diesel engine in our case study), or selecting a turbocharger from the vendor list. With applying the above procedure for selecting a turbocharger, the compressor efficiency of the selected turbocharger at various engine speeds was between 0.67 to 0.76, the turbine efficiency was between 0.68 to 0.74, and the index for appropriate distance from surge and choke lines in compressor map was between 0.2 to 0.72.

**Keywords:** Turbocharger and engine matching, Compressor and turbine optimisation

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\* Corresponding author e-mail: [sepehr@iust.ac.ir](mailto:sepehr@iust.ac.ir)