عنوان مقاله:

Friction of a gasoline engine components and its prediction by artificial neural network

محل انتشار:

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نویسندگان:

Ashkan Moosavian - *PhD, Department of Mechanical Tests and Validation of Powertrain, Irankhodro Powertrain (Company (IPCo*

Seyed Mostafa Mirsalim - *Assistant Professor, Mechanical Engineering Department, Amirkabir University of Technology, Tehran, Iran*

Hasan Nadimi - *Powertrain Design Group*

Majid Arab - *Powertrain Design Group*

خلاصه مقاله:

This paper deals with obtaining the frictions of different components of a gasoline engine under motored condition and then proposing an appropriate procedure to predict them. In internal combustion (IC) engines, it is very important that the friction of each component and mechanism is obtained, and the contribution of each one in overall engine friction is determined. This can highly affect optimal design and production of engine parts. In the current research, the frictions of a gasoline engine and its main components were obtained at different speeds and coolant/oil temperatures by carrying out an engine strip-down test. Afterward, the contribution of each component in overall engine friction was determined. In this research, a procedure based on ANN was also proposed to predict the obtained frictions. Due to the fact that obtaining the frictions of an engine and its components at different operating conditions is really difficult in practice, the proposed intelligent approach can be very useful in this regard. In addition, in order to obtain the effectiveness of the proposed approach, the performance of ANN in prediction of the frictions were determined. The experimental results showed that the reciprocating masses had the maximum contribution in the engine friction at the speed of 6000 rpm and coolant/oil temperature of 90 °C. The results demonstrated that ANN predicted the frictions of the complete engine, valve train, reciprocating masses, crankshaft, oil pump and accessories with the correlation coefficient (R) of 0.991, 0.954, 0.988, 0.995, 0.988 and 0.945, respectively. So the performance of ANN was high enough for prediction of the engine frictions. From the results, the proposed approach is capable of predicting the frictions of the engine and its different components.

کلمات کلیدی:

Gasoline engine; Friction; Prediction; ANN