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Thermodynamics education for energy transformation: a Stirling Engine experiment

We present a thermodynamics experiment suitable for first-year undergraduate students employing Stirling Engines to create a demonstration of energy transformation and to measure the mechanical efficiency of such engines. Using an inexpensive transparent chambered Stirling Engine, students can connect concepts such as the theoretical pressure-volume diagram with the physical movements of the engine's pistons and the resultant useful output work of a spinning wheel. We found the majority of students successfully complete this experiment obtaining results similar to when performed by the authors. In addition to the core thermodynamics lesson, this experiment incorporates DC circuits, oscilloscopes, and data analysis so it can be integrated into a wider undergraduate physics course to combine the teaching of multiple subjects.

Key words

thermodynamics, heat engine, energy, DC circuits, oscilloscopes

Region

UK/Ireland

Authors: YEADON, William George (University of Sheffield (GB)); Dr QUINN, Mark (The University of Sheffield)

Presenters: YEADON, William George (University of Sheffield (GB)); Dr QUINN, Mark (The University of Sheffield)

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