

A Case for Introducing Thermal-Design Optimisation Using Excel Spreadsheet

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Abstract : This paper deals with the introduction of thermal-design optimisation to engineering students by using Microsoft's Excel as a modelling platform. Thermal-design optimisation is an iterative process which involves the evaluation of many thermo-physical properties that vary with temperature and/or pressure. Therefore, suitable modelling software, such as Engineering Equation Solver (EES) or Interactive Thermodynamics (IT), is usually used for this purpose. However, such proprietary applications may not be available to many educational institutions in developing countries. This paper presents a simple thermal-design case that demonstrates how the principles of thermo-fluids and economics can be jointly applied so as to find an optimum solution to a thermal-design problem. The paper describes the solution steps and provides all the equations needed to solve the case with Microsoft Excel. The paper also highlights the advantage of using VBA (Visual Basic for Applications) for developing user-defined functions when repetitive or complex calculations are met. VBA makes Excel a powerful, yet affordable, the computational platform for introducing various engineering principles.

Keywords : engineering education, thermal design, Excel, VBA, user-defined functions

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