Systematic Pedagogy to Line Balancing with Excel

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Abstract: Over the past ten years, simple and inexpensive operations research software that is user friendly to the mentor, student, and instructor is becoming difficult to obtain. This is especially true since Emmons et al.'s (2001) STORM 4.0 for Windows is obsolete for current operating systems and is no longer in print. After a diligent product and literature search, it appears there is no easily-understood, adequate and inexpensive software. Assembly line balancing algorithms are heuristic methods used for balancing an operations or production line. However, most methods employ complex calculations that are challenging to the mentor and mentee. This paper presents pedagogy from a systems approach using Microsoft Excel. The object is to prepare a spreadsheet file with four separate worksheets that are linked to the first worksheet. The step-by-step systematic approach allows the entry on the main worksheet of data such as an annual demand, annual time available, and process time for each operating or production area. When the user changes these data entry points, the efficiencies of each operating or production line are automatically re-computed for all three shifts. Once the spreadsheet and accompanying worksheets were completed, the results were compared to several different heuristic algorithms. The results of this project were satisfactorily tested in a production operations class. The major advantage to the practitioner, engineer, instructor, and student is that Excel is readily available on all personal computers internationally. Students with very little exposure to line balancing were able to master the method within the first hour of exposure.

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