1. Cutting Stock Problem

Definition

Firm produces garden laths fence. There are only standard laths 200 cm long at disposal at storehouse. To produce a fence, firm needs exactly 1200 laths 80 cm long, 3100 laths 50 cm long and 2100 laths 30 cm long. You have to design a cutting plan to minimize total amount of laths 200 cm long.

a) Formulate a mathematical model of the problem, use MPL for Windows to find the optimal solution.

b) Create a macro in VBA for the Excel that generates the table of cutting patterns for generally given sizes of shorter laths (incl. the preparation of Excel file for model in MPL for Windows - definition of ranges names etc.), and subsequently runs the calculation in MPL (CPLEX).

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Suggestions

- Presentations (PDF) - IP and MIP Modelling - 2. Cutting Stock Problem
- Use the standard IP model in the form:

$$\max \sum_{j=1}^{n} c_j x_j \tag{1}$$

$$\sum_{j=1}^{n} a_{ij} x_j \leq b_i \quad \text{for } i = 1, 2, \ldots, m \tag{2}$$

$$x_j \text{ is integer} \quad \text{for } j = 1, 2, \ldots, n \tag{3}$$

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Suggestions

- For the macro in Excel (in the sheet „Input“), the length of the long lath and lengths of shorter laths are given (they can be generally unsorted). For each length, the required amount is given.
- In the sheet „Table“ the macro sorts the list of shorter laths (descending according to the length) and generates the table of all possible cutting patterns. At the beginning, the macro deletes all ranges names. After the table is generated the macro gives the following names to ranges : „Unit“, „Pattern“, „Cuts“, „Requirement“, „Amount“ and „Total“. This is the file ready for MPL.
- You can express the macro to run the calculation in MPL (CPLEX).