University of Macedonia: Decision Lab

Coursework 2021: Case Description

Production Planning for Bicycles

A bicycle manufacturer produces mountain bikes and touring bikes. Demand for the next two months is shown in the following table:

Type	Month 1	Month 2
Mountain	150	200
Touring	125	150

For each bicycle, the production cost, the time required to manufacture the parts and the time required to assemble it are shown in the next table. This table also shows the inventory levels at the start of month 1.

Type	Product cost(£)	Time to manufacture (hours)	Time for assembly (hours)	Current inventory
Mountain	60	12	4	15
Touring	45	10	3	25

Last month, the company used a total of 4000 hours of labour. The company's labour relations policy will not allow the combined total hours of labour (manufacture plus assembly) to increase or decrease by more than 500 hours from month to month.

There are end-of-month inventory holding costs. For each bicycle in stock at the end of a month, the holding cost is 3% of its production cost. The company requires at least 25 bicycles of each type to be in stock at the end of the second month.

Use linear programming to model the problem of planning the production of bicycles for the two months so that demand and all the above requirements are met at mimimum total cost.

Ideally, the company would like to have an algebraic formulation that can be generalized for any set of parameters.