

SILICON CHIP CORPORATION

A Silicon Valley firm specializes in making four types of silicon chips for personal computers. Each chip must go through four stages of processing before completion. First the basic silicon wafers are manufactured, second the wafers are laser etched with a micro circuit, next the circuit is laminated onto the chip, and finally the chip is tested and packaged for shipping. The production manager desires to maximize profits during the next month. During the next 30 days she has enough raw material to produce 4000 silicon wafers. Moreover, she has 600 hours of etching time, 900 hours of lamination time, and 700 hours of testing time. Taking into account depreciated capital investment, maintenance costs, and the cost of labor, each raw silicon wafer is worth \$1, each hour of etching time costs \$40, each hour of lamination time costs \$60, and each hour of inspection time costs \$10. The production manager has formulated her problem as a linear program with the following initial tableau:

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	b
raw wafers	100	100	100	100	1	0	0	0	4000
etching	10	10	20	20	0	1	0	0	600
lamination	20	20	30	20	0	0	1	0	900
testing	20	10	30	30	0	0	0	1	700
	2000	3000	5000	4000	0	0	0	0	0

where x_1, x_2, x_3, x_4 represent the number of 100 chip batches of the four types of chips. After solving by the Simplex Algorithm, the final tableau is:

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	b
0.5	1	0	0	.015	0	0	-.05	25
-5	0	0	0	-.05	1	0	-.5	50
0	0	1	0	-.02	0	.1	0	10
0.5	0	0	1	.015	0	-.1	.05	5
-1500	0	0	0	-5	0	-100	-50	-145,000

QUESTIONS FOR THE SILICON CHIP PRODUCTION PROBLEM

Instructions:

Answer each of the following questions as if it were a separate event. Do not consider the cumulative effects between problems.

1. At what sale price is it efficient to produce the type 1 chip?
2. If it is possible to purchase 1000 more raw silicon wafers, then
 - a) how many would you be willing to purchase,
 - b) what is the most that you would be willing to pay for them, and
 - c) what would be the new production schedule?
3. A new product is to be considered for production. This chip requires ten hours each of etching, lamination, and testing time per 100 chip batch. If it can be sold for \$33.10 per chip, then
 - a) is it efficient to produce, and if so,
 - b) what is the new production schedule?