


••• **13.3** The president of Hill Enterprises, Terri Hill, projects the firm's aggregate demand requirements over the next 8 months as follows:

Jan.	1,400	May	2,200
Feb.	1,600	June	2,200
Mar.	1,800	July	1,800
Apr.	1,800	Aug.	1,400

Her operations manager is considering a new plan, which begins in January with 200 units on hand. Stockout cost of lost sales is \$100 per unit. Inventory holding cost is \$20 per unit per month. Ignore any idle-time costs. The plan is called plan A.

Plan A: Vary the workforce level to execute a "chase" strategy by producing the quantity demanded in the *prior* month. The December demand and rate of production are both 1,600 units per month. The cost of hiring additional workers is \$5,000 per 100 units. The cost of laying off workers is \$7,500 per 100 units. Evaluate this plan. 




EXERCISE 13.3

13.3 (cont'd)

Plan A

Period	Demand	Production (Result of Previous Month)	Inventory (Units)	Stockout (Units)	Hire (Units)	Layoff (Units)	Personnel Cost
1 (Jan)	1,400	1,600	400			200	\$15,000 ←(cost to go from 1,600 in Jan to 1,400 in Feb)
2 (Feb)	1,600	1,400	200		200		10,000 ←(cost to go from 1,400 in Feb to 1,600 in Mar)
3 (Mar)	1,800	1,600			200		10,000
4 (Apr)	1,800	1,800					—
5 (May)	2,200	1,800		400	400		20,000
6 (June)	2,200	2,200					—
7 (July)	1,800	2,200	400			400	30,000
8 (Aug)	1,400	1,800	800			400	30,000 ←(cost to go from 1,800 in August to 1,400 in Sept)
			1,800		\$400 Total		\$115,000
			@ \$20		@ \$100 Personnel Cost:		
			= \$36,000		= \$40,000		

•• **13.4** Using the information in Problem 13.3, develop plan B. Produce at a constant rate of 1,400 units per month, which will meet minimum demands. Then use subcontracting, with additional units at a premium price of \$75 per unit. Evaluate this plan by computing the costs for January through August. 

•• **13.5** Hill is now considering plan C. Beginning inventory, stockout costs, and holding costs are provided in Problem 13.3:

a) Plan C: Keep a stable workforce by maintaining a constant production rate equal to the average requirements and allow varying inventory levels.

••• **13.6** Hill's operations manager (see Problems 13.3 through 13.5) is also considering two mixed strategies for January–August:

a) Plan D: Keep the current workforce stable at producing 1,600 units per month. Permit a maximum of 20% overtime at an additional cost of \$50 per unit. A warehouse now constrains the maximum allowable inventory on hand to 400 units or less.



EXERCISE 13.4

Plan B

Period	Demand	Production	Ending Inv.	Subcon (Units)	Extra Cost
0			200		
1	1,400	1,400	200	—	\$4,000
2	1,600	1,400	0	—	—
3	1,800	1,400	0	400	30,000
4	1,800	1,400	0	400	30,000
5	2,200	1,400	0	800	60,000
6	2,200	1,400	0	800	60,000
7	1,800	1,400	0	400	30,000
8	1,400	1,400	0	—	

Total Extra Cost: \$214,000



EXERCISE 13.5

Plan C					
Period	Demand	Production*	Ending Inv.	Stockouts (Units)	Extra Cost
0			200		
1	1,400	1,775	575		\$11,500
2	1,600	1,775	750		15,000
3	1,800	1,775	725		14,500
4	1,800	1,775	700		14,000
5	2,200	1,775	275		5,500
6	2,200	1,775	0	150	15,000
7	1,800	1,775	0	25	2,500
8	1,400	1,775	375		7,500
					Total Extra Cost: \$85,500



EXERCISE 13.6

Plan D						
Period	Demand	Reg. (Units)	O.T. (Units)	End Inv. (Units)	Stockouts (Units)	Extra Cost
0				200		
1	1,400	1,600	—	400		\$8,000
2	1,600	1,600	—	400		8,000
3	1,800	1,600	—	200		4,000
4	1,800	1,600	—	—		0
5	2,200	1,600	320	—	280	44,000
6	2,200	1,600	320	—	280	44,000
7	1,800	1,600	200	—		10,000
8	1,400	1,600	—	200		4,000
					Total Extra Cost:	
					\$122,000	



EXERCISE 13.6

Period	Demand	Reg. (Units)	O.T. (Units)	End Inv. (Units)	Stockouts (Units)	Extra Cost
0				200		
1	1,400	1,600	—	400		\$8,000
2	1,600	1,600	—	400		8,000
3	1,800	1,600	—	200		4,000
4	1,800	1,600	320	320		22,400
5	2,200	1,600	320	40		16,800
6	2,200	1,600	320	—	240	40,000
7	1,800	1,600	200	—		10,000
8	1,400	1,600	—	200		4,000
					Total Extra Cost:	
					\$113,200	



EXERCISE 13.6

(b)

Plan E

Period	Demand	Production	Subcont (Units)	Ending Inv.	Extra Cost
0				200	
1	1,400	1,600		400	\$8,000
2	1,600	1,600		400	8,000
3	1,800	1,600		200	4,000
4	1,800	1,600			0
5	2,200	1,600	600		45,000
6	2,200	1,600	600		45,000
7	1,800	1,600	200		15,000
8	1,400	1,600		200	4,000
				Total Extra Cost:	
					\$129,000

... **13.16** A large Omaha feed mill, B. Swart Processing, prepares its 6-month aggregate plan by forecasting demand for 50-pound bags of cattle feed as follows: January, 1,000 bags; February, 1,200; March, 1,250; April, 1,450; May, 1,400; and June, 1,400. The feed mill plans to begin the new year with no inventory left over from the previous year and backorders are not permitted. It projects that capacity (during regular hours) for producing bags of feed will remain constant at 800 until the end of April, and then increase to 1,100 bags per month when a planned expansion is completed on May 1. Overtime capacity is set at 300 bags per month until the expansion, at which time it will increase to 400 bags per month. A friendly competitor in Sioux City, Iowa, is also available as a backup source to meet demand—but can provide only 500 bags total during the 6-month period. Develop a 6-month production plan for the feed mill using the transportation method.

Cost data are as follows:

Regular-time cost per bag (until April 30)	\$12.00
Regular-time cost per bag (after May 1)	\$11.00
Overtime cost per bag (during entire period)	\$16.00
Cost of outside purchase per bag	\$18.50
Carrying cost per bag per month	\$ 1.00

		Jan	Feb	Mar	Apr	May	Jun	Unused Capacity	Total Supply
January	Regular Time	800	12						800
	Over Time	200	16	100	17				300
	Sub. Contract.								
February	Regular Time		800	12					800
	Over Time		300	16					300
	Sub. Contract.								
March	Regular Time			800	12				800
	Over Time			300	16				300
	Sub. Contract.			150	18.5				150
April	Regular Time				800	12			800
	Over Time				300	16			300
	Sub. Contract.				350	18.5			350
May	Regular Time					1100	11		1100
	Over Time					300	16	100	400
	Sub. Contract.								
June	Regular Time						1100	11	1100
	Over Time						300	16	400
	Sub. Contract.								
Total Demand		1000	1200	1250	1450	1400	1400	200	7900



EXERCISE 13.16

$$\begin{aligned}\text{Total Cost} &= 4(800*12) + (200*16) + (100*17) + \\ &\quad 5(300*16) + 2(1100*11) + (500*18.5) \\ &= 38,400 + 3,200 + 1,700 + 24,000 + \\ &\quad 24,200 + 9,250\end{aligned}$$

$$\text{Total Cost} = \mathbf{\$100,750}$$