

### Shelby Shelving Example

Shelby Shelving is a small company that manufactures two types of shelves for grocery stores. Model S is the standard model, and model LX is a heavy-duty model. Shelves are manufactured in three major steps: stamping, forming, and assembly. In the stamping stage, a large machine is used to stamp, i.e. cut, standard sheets of metal into appropriate sizes. In the forming stage, another machine bends the metal into shape. Assembly involves joining parts with a combination of soldering and riveting. Shelby's stamping and forming machines work on both models of shelves. Separate assembly departments are used for the final stage of production.

Accounting data for Shelby is given below. The hours required on each machine for each unit of product are shown in the range B5:C6 of the AccountingData Sheet. For example, the production of one model S shelf requires 0.25 hour on the forming machine. Both the stamping and the forming machines can operate for 800 hours each month. The model S assembly department has a monthly capacity of 1900 units. The model LX assembly department has a monthly capacity of only 1400 units. Currently Shelby is producing and selling 400 units of model S and 1400 units of model LX per month.

	A	B	C	D	E	F	G	H	I	J	K
1	Shelby Shelving Data for Current Production Schedule										
2											
3	Machine requirements (hours per unit)					Given monthly overhead cost data					
4		Model S	Model LX				Fixed	Variable S	Variable LX		
5	Stamping	0,3	0,3			Stamping	\$125,000	\$80	\$90		
6	Forming	0,25	0,5			Forming	\$95,000	\$120	\$170		
7						Model S Assembly	\$80,000	\$165	\$0		
8		Model S	Model LX			Model LX Assembly	\$85,000	\$0	\$185		
9	Current monthly production	400	1400								
10						Standard costs of the shelves -- based on the current production levels					
11	Hours spent in departments						Model S	Model LX			
12		Model S	Model LX	Totals		Direct materials	\$1,000	\$1,200			
13	Stamping	120	420	540		Direct labor:					
14	Forming	100	700	800		Stamping	\$35	\$35			
15						Forming	\$60	\$90			
16	Percentages of time spent in departments					Assembly	\$80	\$85			
17		Model S	Model LX			Total direct labor	\$175	\$210			
18	Stamping	22,2%	77,8%			Overhead allocation					
19	Forming	12,5%	87,5%			Stamping	\$149	\$159			
20						Forming	\$150	\$229			
21						Assembly	\$365	\$246			
22						Total overhead	\$664	\$635			
23						Total cost	\$1,839	\$2,045			
24											

Model S shelves are sold for \$1800, and model LX shelves are sold for \$2100. Shelby's operation is fairly small in the industry, and management at Shelby believes it cannot raise prices beyond these levels because of the competition. However, the marketing department feels that Shelby can sell as much as it can produce at these prices. The costs of production are summarized in the AccountingData sheet. As usual, values in blue borders are given, whereas other values are calculated from these.

Management at Shelby just met to discuss next month's operating plan. Although the shelves are selling well, the overall profitability of the company is a concern. The plant's engineer suggested that the current production of model S shelves will be cut back. According to him, "Model S shelves are sold for \$1800 per unit, but our costs are \$1839. Even though we are only selling 400 units a month, we're losing money on each one. We should decrease production of model S." The controller disagreed. He said that the problem was the model S assembly department trying to absorb a large overhead with a small production volume. "The model S units are making a contribution to overhead. Even though production doesn't cover all of the fixed costs, we'd be worse off with lower production."

What can you recommend to Shelby management, with a short verbal argument supporting the engineer or the controller.

**Notes on AccountingData calculations:** The fixed overhead is distributed using activity-based costing principles. For example, at current production levels, the forming machine spends 100 hours on model S shelves and 700 hours on model LX shelves. The forming machine is used 800 hours of the month, of which 12.5% of the time spent on model S shelves and 87.5% is spent on model LX shelves. The \$95,000 of fixed overhead in the forming department is distributed as \$11,875 ( $=95,000 \times 0.125$ ) to model S shelves and \$83,125 ( $=95,000 \times 0.875$ ) to model LX shelves. The fixed overhead per unit of output is allocated as \$29.69 ( $=11,875/400$ ) for model S and \$59.38 ( $=83,125/1400$ ) for model LX. In the calculation of the standard overhead cost, the fixed and variable costs are added together, so that the overhead cost for the forming department allocated to a model S shelf is \$149.69 ( $=29.69+120$ , shown rounded up to \$150). Similarly, the overhead cost for the forming department allocated to a model LX shelf is \$229.38 ( $=59.38+170$ , shown rounded down to \$229).