HARVARD | BUSINESS | SCHOOL

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WILLIAM J. BRUNS, JR.

Mile High Cycles

In 2005, Bob Moyer was reviewing production costs for Mile High Cycles. Located in Denver, Colorado, the company sold very high-quality, handcrafted mountain bikes to bicycle retailers throughout the country. Sales for the company were $13 million that year.

Bob Moyer had been an avid cyclist in college, racing for the Stanford University cycling team while completing his degree in mechanical engineering. After working for a few years as a design engineer for a company in Denver, Bob decided to start his own business. As a hobby, he had designed and built several prototypes of a mountain bike, which had been enthusiastically received by his mountain-biking friends. Approaching several friends and relatives for start-up money, Mile High Cycles was founded in 2003.

A mountain bike was a bicycle with 15 to 21 speeds, designed and built to take the punishment of riding on dirt trails and roads. The bikes were first made by avid cyclists who customized their 10-speed road bikes in order to ride on mountain trails and dirt roads. Some with framebuilding experience began to experiment making their own frames in order to handle better the additional demands of off-road riding. By 1992, several small companies had emerged selling bicycles specifically designed for riding under these conditions.

During the rest of the 1990s, mountain bikes had taken off in popularity, not only for use off-road but also for use in the city, where their sturdy construction could withstand the pounding from potholes and curbs. In addition, many casual cyclists preferred the mountain bike's more upright riding position in comparison to that of the hunched position of the 10-speed road bike. Sales of all bicycles in the United States had declined in 2003. However, over the same time period, sales of mountain bikes increased to more than 2.0 million units.

Bob Moyer had planned to produce 10,000 bikes in 2004, all of one model. Operations at Mile High Cycles consisted of three departments: frames, wheel assembly, and final assembly. In frames, steel tubing was cut to length for the components of the frame. Then the pieces were carefully welded together to form the completed frameset. This part of the process was quite time-consuming, requiring frequent inspection and measurement to ensure that the frameset was aligned perfectly. After welding, the frame was painted in one of 10 different color schemes and prepared for final assembly.

In wheel assembly, front and rear wheels were assembled from their key components: hubs, spokes, and rims. All of the components were purchased from an outside supplier. Mile High Cycles

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Professor William J. Bruns, Jr. and David J. Ellison prepared this case. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

used a high-quality automatic lacing and truing machine to build its wheels. This machine would lace the spokes between the hub and rim and then automatically tighten the spokes to the appropriate tension. The machine was quite precise but would occasionally damage spokes during the insertion process. In such a case, the operator would replace any damaged parts and restart the machine. Each wheel would also be inspected and trued by hand in order to insure that the wheels were in perfect alignment.

In final assembly, the frame and wheels were combined with other purchased parts to create the final package that would then be shipped to bicycle dealers. In this area, the front fork and many other key components were attached to the frame, and the inner tubes and tires were mounted on the wheels. In order to minimize damage while shipping, some of the bicycles' components were left packaged for the bicycle dealer to assemble before selling the bike to the final customer. All of the components were purchased from outside suppliers and then were combined to form kits for the bicycles. Mile High Cycles carried an inventory of spare parts to replace any parts damaged during assembly or shipping, although such replacement was quite infrequent.

In reviewing his costs, Bob noted that he had produced 10,800 bicycles in 2004, 800 more than planned. Bob thought that operations during the year had done well to meet the additional demand, but he wondered if Mile High Cycles was doing a good job in managing its costs. **Exhibit 1** shows the planned material, labor, and overhead costs for 2004. **Exhibit 2** shows the actual material, labor, and overhead costs for that year.

Questions

1. Determine the direct cost and overhead variances. What might be causing each of the variances to occur?

2. Should Bob Moyer be concerned about Mile High Cycles's performance? Where should he be prepared to direct his attention? What additional information should he try to obtain?

3. Are there any purposes for which a total, per unit variance would be more useful than a series of functional variances? If so, for what?

Exhibit 1 2004 Production Budget

Budget based on 10,000 bicycles production

Frame assembly:		
Steel tubing	$ 3,300,000	(110,000 lbs. @ $30.00/lb.)
Paint	25,000	(1,250 gals. @ $20.00/gal.)
Labor	$ 1,500,000	(100,000 hrs. @ $15.00/hr.)
Total frame	$ 4,825,000	
Wheel assembly:		
Parts	$ 1,200,000	(10,000 kits @ $120.00/kit)
Labor	65,000	(5,000 hrs. @ $13.00/hr.)
Total wheel	$ 1,265,000	
Final assembly:		
Parts	$ 3,500,000	(10,000 kits @ $350.00/kit)
Labor	105,000	(7,500 hrs. @ $14.00/hr.)
Total final assembly	$ 3,605,000	
Overhead costs:		
Rent	$ 250,000	
Office staff	100,000	
Depreciation	100,000	
Other costs	750,000	(estimated to be 2/3 variable)
Total overhead	$ 1,200,000	
Total Annual Costs	$10,895,000	

Exhibit 2 2004 Production Costs

Actual production: 10,800 bicycles

Frame assembly:		
Steel tubing	$ 3,572,100	(113,400 lbs. @ $31.50/lb.)
Paint	28,187	(1,375 gals. @ $20.50/gal.)
Labor	$ 1,528,050	(100,200 hrs. @ $15.25/hr.)
Total frame	$ 5,128,337	
Wheel assembly:		
Parts	$ 1,317,600	(10,800 kits @ $122.00/kit)
Rework parts	25,000	(spokes and rims)
Labor	74,250	(5,500 hrs. @ $13.50/hr.)
Total wheel	$ 1,416,850	
Final assembly:		
Parts	$ 3,963,600	(10,800 kits @ $367.00/kit)
Rework parts	45,000	(miscellaneous parts)
Labor	116,000	(8,000 hrs. @ $14.50/hr.)
Total final assembly	$ 4,124,600	
Overhead costs:		
Rent	$ 250,000	
Office staff	100,000	
Depreciation	100,000	
Other costs	850,000	
Total overhead	$ 1,300,000	
Total Annual Costs	$11,969,787	