

Excel Dale Long, vice president of manufacturing for ToysPlus, Inc., finished reading the weekly production report for the week ended September 16, 2011. Inventories were up once again, and service levels were lower than expected. Dale wondered why these problems could not be solved once and for all. Last year he had installed a new production and inventory control system on the company's server. While the system drastically reduced inventories and improved service levels at first, things had gotten worse over the last few months.

Dale took the report and walked to Andrea Meline's office next door. Andrea had received her M.B.A. a few years ago from a prestigious business school and was now in charge of production control for the company. After exchanging the usual greetings, Dale asked Andrea why the latest figures were not better. Andrea responded, "Dale, we continue to get poor forecasts from marketing, and we have to carry more inventory than we would like in order to protect ourselves from unreliable vendor deliveries. The sales promotion that we ran last week on surplus toy trucks did not work as well as we expected." Dale interrupted, "Andrea we can no longer afford to achieve these kinds of results. You have got to find a solution. I am counting on you to come up with something to improve the situation. Otherwise we may both be out of a job."

BACKGROUND

ToysPlus is a small, privately held company in the toy industry, with sales of about \$20 million a year. The company was started in 1951, manufacturing an innovative line of plastic toys and trucks that were

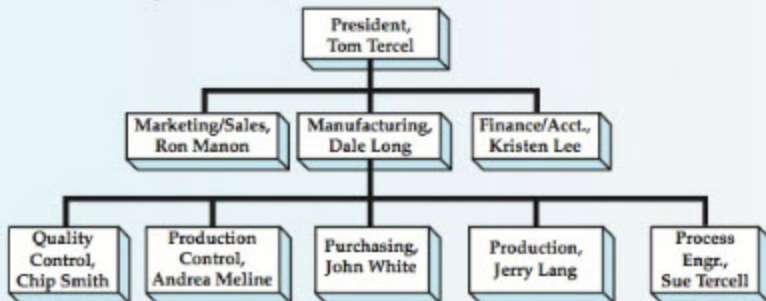
very durable and low-priced. Over the years it has added several lines of toys and is now making 22 different toys, including games, dolls, toy vehicles, and novelty items. The company has a typical functional organization, as shown in Exhibit 1.

ToysPlus has had relatively poor financial results, as shown in Exhibit 2. Profits are averaging only 5 percent of sales, and return on assets is less than 10 percent. To improve the situation, the company has decided to make a major effort to reduce inventories and to improve customer service. In an effort to reduce costs, the company has begun to redesign the toys for manufacturability and automate its production process. The company feels that unit production costs could be reduced at least 5 percent per year by these efforts. The company also wants to achieve at least 15 inventory turns per year¹ and a service level of 95 percent. Service level is defined as the percentage of orders filled within one week of customer order. The current service level is 90 percent.

Manufacturing operations are organized around the different types of toys that are manufactured. Each type of toy has its own assembly line and its own dedicated workers. For example, three plastic toys—trucks, autos, and robots—are assembled on line 1. Only one toy can be assembled at a time on this line; then there is a changeover to the next toy. Currently, line 1 has 10 workers who engage in assembly, inspection, and packing of the toys. Some of the parts that are assembled into the finished toys are made on the company's plastic-molding machines. Other parts are purchased from outside suppliers.

¹ Inventory turns are based on the ratio of COGS to inventory.

EXHIBIT 1 Organization chart.



This case was prepared as a basis for class discussion, not to illustrate either effective or ineffective handling of an administrative situation.

EXHIBIT 2 Financial statements.

Profit and Loss (in \$000) Year Ending June 30, 2011		Balance Sheet (in \$000) As of June 30, 2011	
Net Sales	\$20,100	Assets	
Cost of goods sold		Current assets %	
Direct labor	\$2,353	Cash	\$ 1,050
Materials	6,794	Accounts receivable	2,500
Overhead	2,608	Inventory	2,400
Total COGS	<u>\$11,755</u>	Other	540
Gross profit	\$ 8,345	Total curr. assets	\$6,490
G&A expense	4,932	Fixed assets	
Marketing costs	<u>1,776</u>	Net fixed assets	4,900
Profit before tax	\$ 1,637	Total assets	<u>\$11,390</u>
Income tax	650	Liabilities	
Net profit	<u>\$ 987</u>	Current liabilities	
		Notes payable	\$ 3,300
		Accounts payable	3,200
		Accruals	400
		Total curr. liab.	\$ 6,900
		Long-term debt	2,300
		Total liabilities	<u>\$ 9,200</u>
		Capital stock	\$ 1,500
		Retained earnings	690
		Total net worth	<u>\$ 2,190</u>
		Total liabilities and net worth	<u>\$11,390</u>

Production control is based on the MRP system. Every week a master schedule is prepared for the next six weeks. This master schedule specifies for assembly line 1, for example, the number of trucks, autos, and robots that will be produced in each week, as shown in Exhibit 3. Forecasts of weekly demand are received each week from marketing. Using past experience, Andrea adjusts these forecasts to reflect more realistic estimates of demand. She also utilizes the lot sizes shown in the Exhibit 3 master schedule for each of the three toys. These lot sizes are based on past practice in the company. A run-out time philosophy is used to first schedule the toy that has the lowest ratio of inventory to weekly demand (the run-out time). As a result, the master schedule is prepared and entered into the computer. However, this master schedule might be infeasible when not enough parts are available in inventory or insufficient lead time remains to order more parts. As a result, the master schedule is checked for feasibility and adjusted accordingly before a final master schedule is approved.

The computer performs a parts explosion using the bill of materials and the on-hand inventories

shown in Exhibit 4. Each toy requires several parts, as indicated in the bill of materials. For example, each auto requires one body, four wheels, two side windows, and one windshield. These parts are assembled, the product is inspected, and the toy is packed, which requires a total of .1 labor hour per auto. With 10 people working on the assembly line, at present, there are 350 hours of productive time available per week (35 hours each times 10). If the entire week is used to make autos, a total of 3,500 autos can be produced (350/.1). It takes .2 hour to make a truck and .15 hour to make a robot, thereby making it possible to produce a maximum of 1,750 trucks or 2,333 robots, if the entire line is devoted to either of these products. Production, however, is scheduled in lots, and the entire week is not necessarily devoted to only one toy.

In between products it takes all 10 people one hour to change the setup of the line. This change-over involves moving out the parts for the old toy, moving in the parts for the new toy, arranging the jigs and fixtures for assembly, and making trial runs to make sure that quality is right. The shop labor rate is \$10 per hour for wages, fringe benefits are

EXHIBIT 3 Master schedule prepared September 16, 2011.

	Week Beginning					
	Sept. 19	Sept. 26	Oct. 3	Oct. 10	Oct. 17	Oct. 24
Auto	3,500	500				3,500
Truck		1,500	1,750			
Robot				2,333	2,333	
Weekly Forecast of Demand						
	Week Beginning					
	Sept. 19	Sept. 26	Oct. 3	Oct. 10	Oct. 17	Oct. 24
Auto	1,100	1,150	1,200	1,300	1,400	1,500
Truck	500	450	400	350	300	300
Robot	700	650	650	625	625	600

Products



Toy auto



Toy truck



Toy robot

EXHIBIT 4 Bill of materials.

Part Number	Description	Number Required per Unit	Cost Each	Weeks Lead Time	Current Inventory	On Order
1019	Toy auto		\$3.20	1	4,000	
523	Car body	1	1.45	3	2,500	
525	Wheels	4	.30	2	9,800	
529	Side windows	2	.15	1	4,300	
531	Windshield	1	.25	2	2,620	
1021	Toy truck		\$6.50		2,000	
615	Cab	1	1.70	3	1,200	800 due 9/26
617	Wheels dual	8 sets	.25	2	9,900	
619	Wheels single	2	.30	2	2,500	
621	Trailer	1	2.20	4	4,600	1,200 due 10/3
1023	Toy robot		\$4.10	1	1,500	
730	Body	1	1.80	2	1,600	
732	Arms	2	.35	2	3,500	
734	Legs	2	.25	1	4,020	
736	Head	1	1.10	2	2,150	

33 percent additional, and there is \$6 per hour charged for overhead. It costs 25 percent to carry inventory for a year. For parts and components that are ordered, it costs \$25 to place each order. When the line is changed over, not only is a setup cost incurred for the labor to change the line but also an order is also triggered for each of the parts that is used to make the final product. The total setup cost of a line changeover is therefore the total of these costs.

Purchasing does not always buy the exact number of parts that are ordered by the production control department. Adjustments are made to take advantage of price breaks from suppliers or to achieve full-truckload shipments. As a result, some additional parts might be purchased in order to reduce purchasing costs. Also, suppliers do not always ship the component parts when promised. As a result, ToysPlus carries safety stock inventory to protect the master production schedule and to keep the assembly lines running, no matter what. About one week of safety stock is carried to protect for late supplier deliveries. Management has mandated that the assembly lines will not shut down.

Dale Long has stated that the company will not lay off workers on a week-to-week basis. Thus, if demand should be less than capacity, for example, by 10 percent in a week, production will be scheduled to full capacity to keep the workers busy. If this condition should continue for several weeks, workers will be laid off to adjust capacity. In a similar way, workers will be put on overtime to meet demand temporarily. But if demand exceeds normal capacity for several weeks, more workers will then be added.

A six-week rolling production schedule, based on existing capacity and lead times, is used. Each week one more week is added to keep the total master schedule horizon at six weeks. Production is adjusted each week in line with available parts, capacity, and observed demand for toys.

HAPPY HOUR

Andrea walked to General Joe's, a favorite watering hole, for happy hour with her friend from purchasing, John White. Andrea began,

John, I don't know what I am going to do. Dale Long has laid the law down that I must reduce inventory and improve service levels. There is no alternative or excuses this time, I must do it! I'm

not sure where to start. I would like better sales forecasts, but is that realistic to expect? Can I depend on marketing? I also could reduce inventory by achieving more reliable deliveries from our suppliers. Will they cooperate? Maybe we will have to react faster in laying off and hiring workers in order to keep capacity closer to demand. What do you think of this situation? Is there a solution?

John answered,

You must remember, Andrea, the world is filled with hustlers and liars. The salespeople lie to you about forecasts, so they can have more inventory, just in case they need it. We in purchasing lie to our suppliers about when we need the parts, so that we can be sure to get them when we really need them. You pad the production schedule a little bit, just to make sure you can meet the shipments. We all are trying to cover ourselves so that we don't run out of stock. There isn't a solution to this problem, because we are dealing with human nature. I hate to say it, but maybe top management's expectations are a bit unrealistic that inventory should be reduced and service improved. How can they expect anyone to accomplish these goals in an environment like this?

Discussion Questions

1. Calculate economic order quantities for each of the three types of toys. The EOQ formula is recommended from the supplement to Chapter 15 that considers uniform lot delivery of the toys.
2. Prepare a master production schedule for the next six weeks using the EOQs calculated in question 1 and a workforce of 10 employees. What inventory turnover ratio is achieved by this master schedule? How does this turnover compare with past levels and with management's goals?
3. Prepare a parts explosion to support the master schedule. What parts should be ordered each week?
4. What should Andrea Meline do to meet the inventory and service goals stated by management?
5. How should Andrea deal with the organization issues presented in this case?