



Executive Shirt Company, Inc.

The Executive Shirt Company (ESC) had built a solid reputation in the apparel industry by supplying several well-known labels with high-quality, competitively-priced men's dress shirts. Prompted by a recent dip in ESC's sales, general manager Dwight Collier had decided to expand the company's product line to take advantage of what he thought was a tremendous opportunity in the custom-sized dress shirt market. Custom-sized shirts currently commanded a substantial price premium: customers paid at least 75% more for a custom-made shirt than for an off-the-shelf shirt of the same quality and construction. In addition, customers often waited 6 weeks or longer for delivery of their custom-sized shirts. Collier thought that many men who currently bought off-the-shelf shirts would prefer custom-made shirts, but were deterred by high prices and long delivery times. After several retailers ESC currently supplied expressed enthusiasm for ESC's expansion into custom shirts, Collier decided to begin production of a line of moderately-priced custom-made dress shirts that would be delivered within 10 working days after the customer placed the order. Collier expected ESC's custom shirts to command a \$10 wholesale and \$20 retail price premium over ESC's standard-sized shirts. This plan was not too far-fetched: Levi-Strauss's popular custom-fit women's jeans were delivered in 2 weeks and were priced at retail only \$10 more than regular jeans.

The ESC Production Facility

ESC's current production process was designed to make large volumes of shirts with limited product variety and relatively constant demand. Shirts were offered in a few basic styles and colors; for example, white and blue shirts constituted over 80% of the company's total sales volume. All production took place using a traditional batch process in ESC's Pauquet, Mississippi factory.

The Pauquet shop floor was divided into work areas where the different operations required to cut and assemble a shirt were performed (**Exhibit 1**). Shirt patterns¹ were cut on a computer-controlled cutting machine that could cut as many as 60 layers of cloth (of the same or multiple colors) at the same time. The factory's current policy was to layout and cut 60 layers of cloth at a time. Setting up the machine was a laborious process—it took about 1.5 minutes to carefully roll out each layer of fabric on the cutting table (a total of 90 minutes for 60 layers). Patterns for up to 8 shirts could be laid out at the same time (**Exhibit 2**). Thus, for each shirt pattern laid out, pieces for 60 shirts

¹ A shirt pattern was a template which included all of the components of a shirt (sleeves, back, cuffs, etc.).

This case was prepared as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

Copyright © 1995 by the President and Fellows of Harvard College. To order copies or request permission to reproduce materials, call 1-800-545-7685 or write Harvard Business School Publishing, Boston, MA 02163. No part of this publication may be reproduced, stored in a retrieval system, used in a spreadsheet, or transmitted in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—without the permission of Harvard Business School.

of the same style and size would be cut simultaneously. Once the fabric was laid out, it took on average 30 minutes to cut all pieces for the 8 patterns from the cloth and remove them from the cutting table. Cutting took the same amount of time regardless of the number of layers of cloth being cut. The four cutting machine operators were fully utilized while the cloth was being laid out and cut.

After cutting, the shirts were batched into batches of parts to make 60 shirts. The batches were then sent to sewing, where 12 operations were performed before the finished shirts were inspected, ironed, and packed (**Exhibit 3**). The sewing operations all used similar sewing machines. Bins, each containing one batch of 60 shirts (or pieces for 60 shirts), were wheeled from one operation to another by 4 material handlers. On average there were 3 batches of shirts for each worker (post-cutting), including the batch that was currently being worked on at that station. A total of 64 direct workers (performing all the operations from cutting to packaging) worked a single 8-hour shift,² 5 days a week, 20 days per month. The 4 material handlers and 64 direct workers were each paid \$6.00 per hour (excluding benefits) on the regular shift, and \$9.00 per hour on overtime, although overtime was seldom used (see **Exhibit 4** for the cost structure for a standard-sized shirt).

Planning the Custom Shirt Line

Collier knew that the introduction of a custom-sized shirt line would require some changes to the manufacturing process. As a first step, Collier ordered a new "low-ply" laser cutting machine. The new cutting machine was small: it could cut only one shirt pattern at a time out of up to 5 layers of cloth. However, this new machine was extremely fast: the entire process of laying out a pattern and cutting the shirts took only 2.5 minutes. Cutting only one pattern at a time rather than 8 would result in a higher scrap rate—Collier estimated that material costs for custom-sized shirts would be about 10% higher than for standard-sized shirts. Collier expected that any plan for manufacturing custom-sized shirts would require hiring a new worker to operate the new machine; the existing cutting machine would continue to be operated by a dedicated team of 4 workers.

Collier wanted to study several options for designing the manufacturing process for the custom shirt line. He asked two of his managers, Mike and Ike, to come up with plans for incorporating production of custom shirts into the existing manufacturing process. He specified only that the manufacturing lead time for the custom shirts had to be less than 5 working days, and the plans should initially allow for production of 2,000 custom shirts per month. The factory was currently producing standard-sized shirts at a volume of 16,000 per month. The production volume of the standard-sized shirts was expected to remain the same. He also cautioned Mike and Ike against making large capital expenditures before this foray into the custom-shirt market had proven to be successful.

Mike's Plan (**Exhibit 5**)

Mike thought that ESC should require a minimum order quantity of 5 custom shirts of a given size, and devised his plan accordingly. He believed that the current production facilities could easily accommodate the increased volume represented by the custom shirt line. The new cutting machine could be set up next to the existing cutting machine, and would be run by the one new worker dedicated to that machine. Regular shirts would be cut on the old machine, while custom shirts would be cut on the new machine. Batches of custom shirts would be sewn with batches of regular shirts. In order to shorten the lead time and to accommodate batches of 5 custom-sized shirts

² Workers worked from 8:00 AM to 5:00 PM with one hour of unpaid lunch and no formal breaks. Workers took informal breaks as desired and as allowed by their workload.

coming through the factory, Mike proposed reducing the batch size for all shirts from 60 to 5 shirts. He also thought that it would be prudent to add extra batches of buffer inventory at each station after cutting, for a total of 6 batches per worker.

Ike's Plan (Exhibit 6)

Ike, on the other hand, thought that custom-shirt production should be kept separate from the production of standard-sized shirts. He proposed that all of the custom shirt operations, from cutting to packaging, be done on a separate assembly line. Because there was excess capacity in the factory, he proposed moving 1 worker from each sewing operation, 1 worker from inspection, 1 worker from ironing, and 1 worker from packaging to the new line. In addition, 12 sewing machines and one ironing machine could be moved from the regular shirt production to the custom shirt line. On the new line, each operator would perform the same operation he or she had been assigned in the current factory, in the same sequence. Each operator would work on one shirt at a time, with an average of 3 shirts for each of the 15 workers on the line (post-cutting). As in Mike's plan, one new worker would be hired to operate the new cutting machine. Ike planned to leave the regular shirt production process unchanged, except that each operation would be performed by one less worker (except cutting). He thought that the reduction of people and equipment in the regular shirt production area could easily be made up by asking the shift to work a small amount of overtime if necessary.

Exhibit 1 The ESC Factory Floor

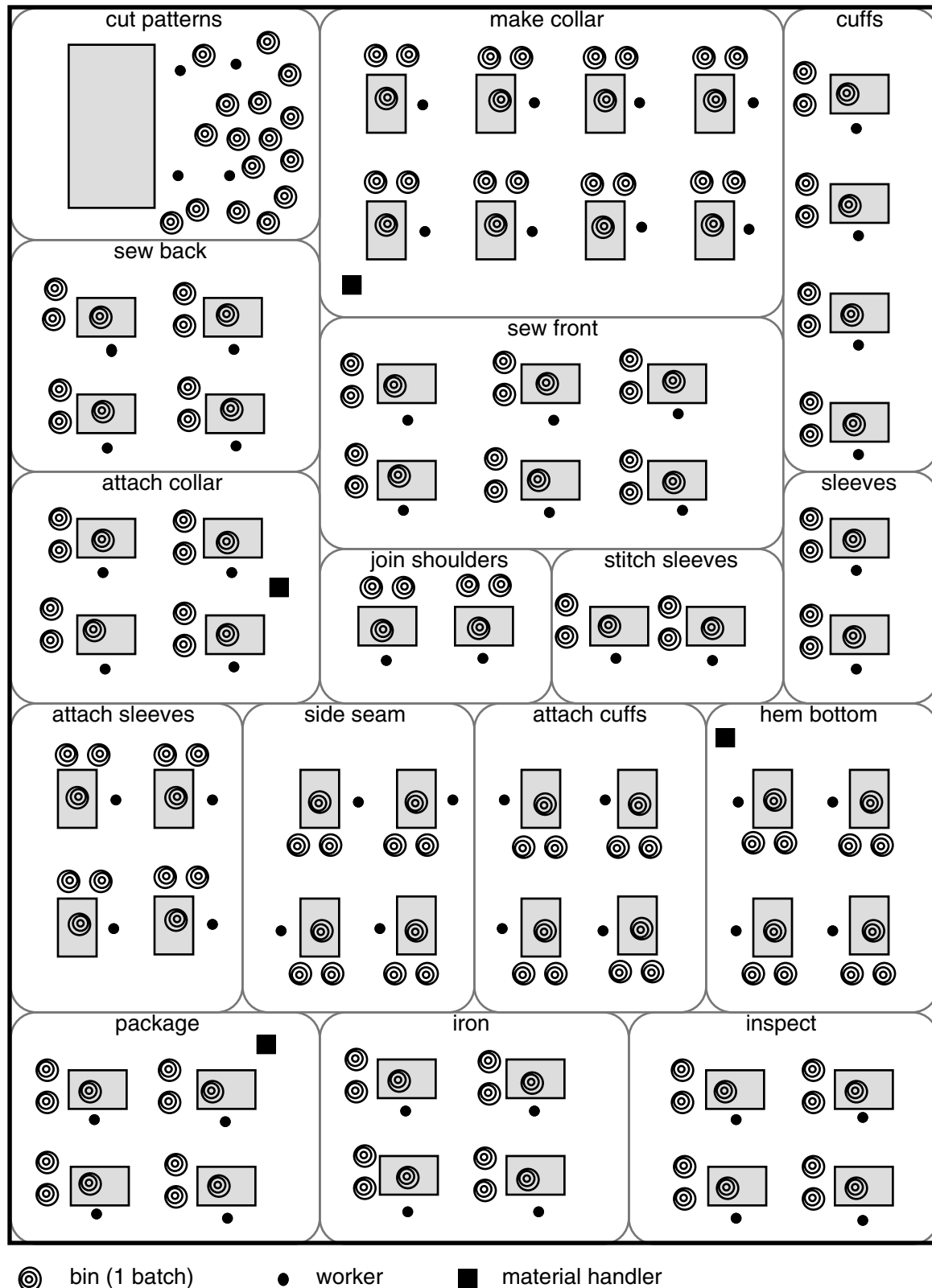


Exhibit 2 The Cutting Operation

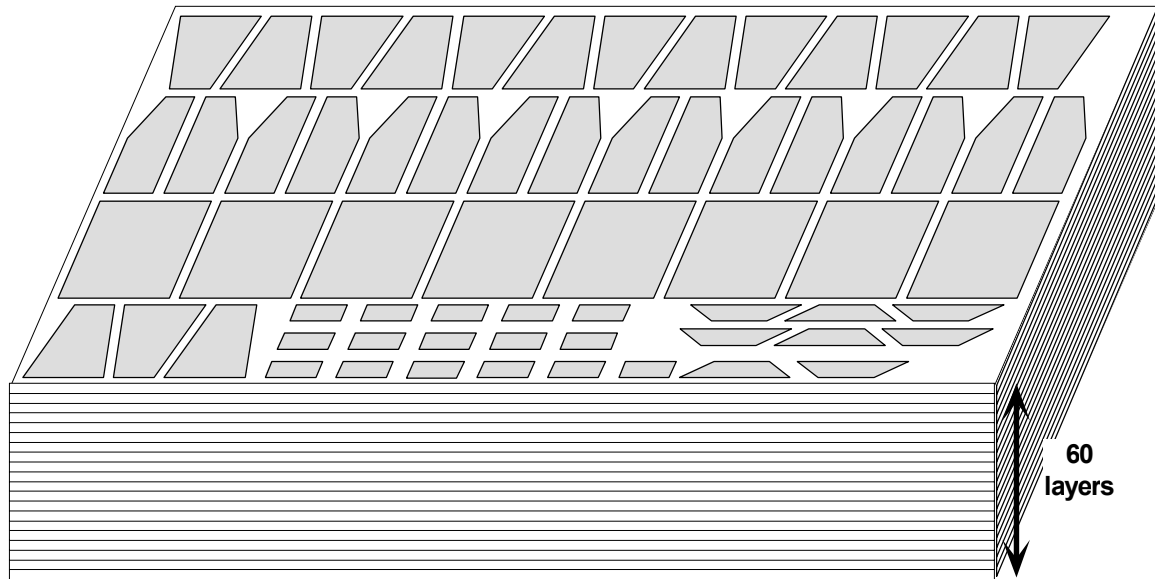


Exhibit 3 Current Production of Regular Shirts at ESC, Inc.

Type of Operation	Number of Workers	Number of Machines	Average WIP (number of 60-shirt batches)
Cutting	4	1	16
Sewing	48	48	144
Inspection	4		12
Ironing	4	4	12
Packaging	4		12

Operation	Regular Shirts Labor Content (minutes per shirt)	Number of Workers
1. Make collar	3.90	8
2. Make cuffs	2.00	4
3. Make sleeves	0.65	2
4. Make front	2.50	6
5. Make back	1.70	4
6. Join shoulders	0.66	2
7. Attach collar	1.65	4
8. Attach sleeves	1.55	4
9. Stitch down sleeves	0.65	2
10. Sew side seam	1.80	4
11. Attach cuffs	1.55	4
12. Hem bottom	1.70	4
13. Inspect	1.50	4
14. Iron	1.95	4
15. Fold, Package	1.75	4

Exhibit 4 Cost Structure for a Standard-Sized Shirt (current production process)

Raw Materials	\$7.00
Total Labor (Direct + Indirect*)	\$4.50
Other Indirect Costs	\$4.50
Total Manufacturing Cost	\$16.00
Wholesale Price	\$25.00
Retail Price	\$50.00

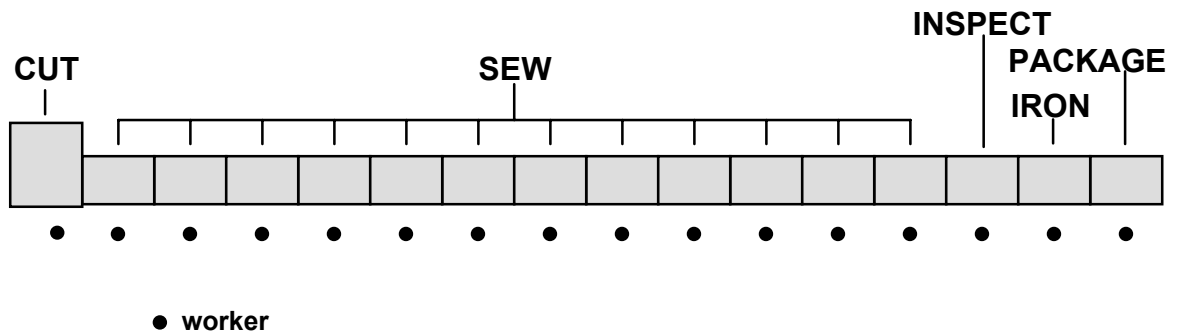
*Indirect labor costs include costs of material handling and supervisory labor.

Exhibit 5 Mike's Plan for Regular and Custom Shirts

Type of Operation	Number of Workers	Number of Machines	Average WIP (number of 5-shirt batches)
Cutting	5	2	36
Sewing	48	48	288
Inspection	4		24
Ironing	4	4	24
Packaging	4		24

Exhibit 6 Ike's Plan for Regular and Custom Shirts**Regular Shirts**

Type of Operation	Number of Workers	Number of Machines	Average WIP (number of 60-shirt batches)
Cutting	4	1	16
Sewing	36	36	108
Inspection	3		9
Ironing	3	3	9
Packaging	3		9

Custom Shirt Line

Case Analysis and Recommendations

In answering the questions below, clearly state your assumptions and show all calculations. Justify your reasoning based on facts presented in this case. Be concise and specific.

Question 1 (50 points). Compute the following quantities for the current production process as well as for Mike's and Ike's plans, assuming the plans are implemented as described in the case.

	Current Process	Mike's Plan	Ike's Plan	
	Regular Shirts	Regular & Custom Shirts	Regular Shirts	Custom Shirts
a) Actual Cycle Time (min./shirt)*				
b) Manufacturing Lead Time (days)				
c) WIP Inventory (shirts)				
d) Production Capacity (shirts/day)**				
e) Capacity Utilization				
f) Direct Labor Content (min./shirt)				
g) Direct Labor Utilization				
h) Direct Labor Cost (\$/shirt)				

*Assume 8-hour work day, or 8 hours plus overtime if necessary.

**Assume 8-hour work day.

Question 2 (50 points). Compare the two plans, in terms of both regular shirt production and custom-shirt production. Based on your analysis, what is your recommendation for Dwight Collier? (Maximum 600 words.)