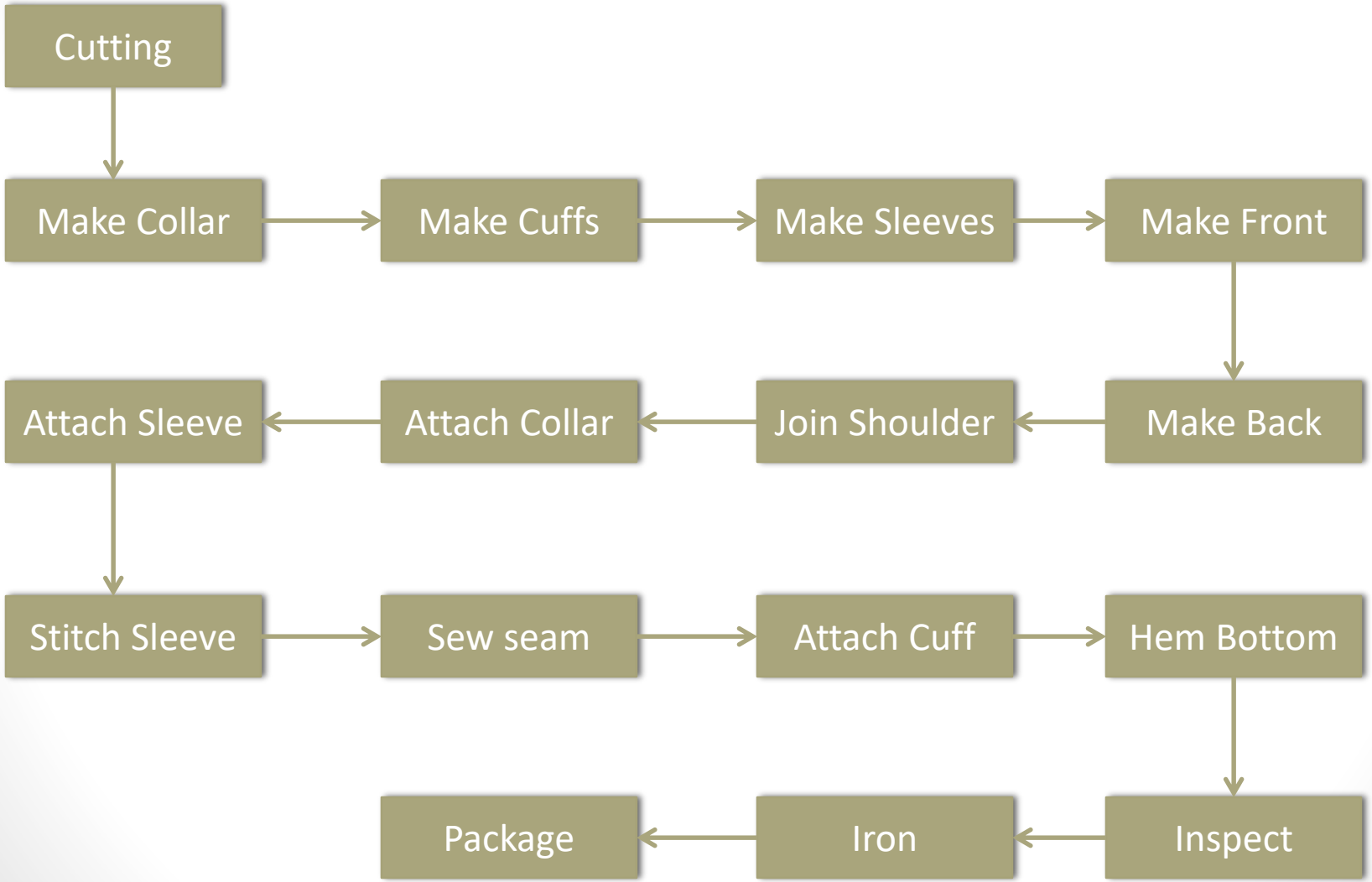
Executive shirt

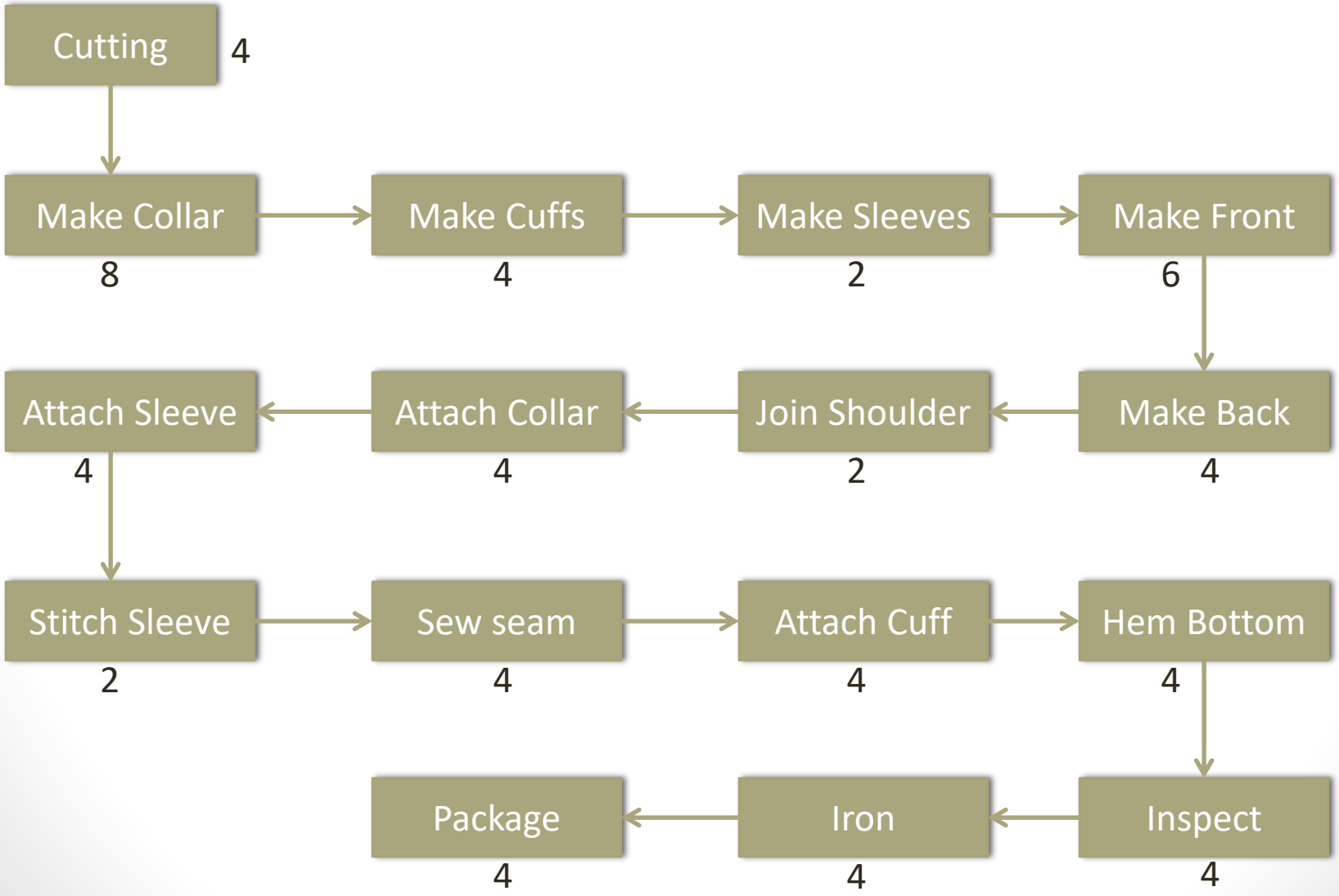
Introduction

- Opportunity in the custom sized dress shirt market
- Price of custom sized shirt 75% more than normal shirts
- Waiting time for customers is 6 weeks or longer
- High price and long delivery times are issues.
- Price premium of $10 in wholesale market and $20 in retail market
- Competitor delivers a custom shirt in 2 weeks and is priced only $10 more than regular jeans at retail

Production Process (Exhibit 3)



Production Process (Exhibit 3)



Current Production Process

- 60 layers with 8 shirts in each layer are rolled out for cutting
- Total setup time for cutting: 90 mins + 30 mins = 120 mins
- After cutting, batch of 60 shirts are kept for the next stages.
- For the post cutting stages, 3 batches of shirts for each worker
- 8 hour regular shift, 5 days a week, 20 days per month
- Regular and overtime wages are $6 /hour and $9 /hour

- New cutting machine with total cutting time of 2.5 minutes for a batch size of 5 shirts
- 10% higher scrap rate in the new cutting machine
- Target: 16000 regular shirts per month and 2000 custom shirts per month

Mike's Plan

- Batch size of 5 shirts in the new cutting machine
- One new worker dedicated to running the new cutting machine for custom shirts
- Post cutting stages will remain same with batches of custom shirts will be considered together the batches of regular shirts
- Reduce the batch size across all stages from 60 shirts to 5 shirts
- Keep 6 batches per worker

Ike's Plan

- Custom shirt production should be kept separate from the production of standard sized shirts
- Separate cutting, sewing (12 stages), ironing, packaging and inspection stages for customer shirts
- One new worker hired for new cutting machine
- 3 shirts for each worker in the new line
- Regular shirt production process unchanged, except that one worker will be less in each stage (except cutting)

Performance Measures

- Process measures:
  - Cycle time
  - Manufacturing lead time
  - WIP inventory
  - Production capacity
  - Capacity Utilization
  - Direct labor content
  - Direct labor utilization
- Quality Measures:
  - Scrap rate in the production
- Financial Measures:
  - Direct labor cost

Regular Production Plan

Actual Cycle Time(min./shirt)	
Manufacturing Lead Time(days)	
WIP Inventory(shirts)	
Production Capacity(shirts/day)	
Capacity Utilization	
Direct Labor Content(min./shirt)	
Direct Labor Utilization	
Direct Labor Cost($/shirt)	

Regular Production Plan

Actual Cycle Time(min./shirt)	0.5
Manufacturing Lead Time(days)	12.25
WIP Inventory(shirts)	11760
Production Capacity(shirts/day)	960.0
Capacity Utilization	83.3%
Direct Labor Content(min./shirt)	26.51
Direct Labor Utilization	69.04%
Direct Labor Cost($/shirt)	3.84

Mike's Plan

	Regular Shirts	Customized Shirts
Actual Cycle Time(min./shirt)		
Manufacturing Lead Time(days)		
WIP Inventory(shirts)		
Production Capacity(shirts/day)		
Capacity Utilization		
Direct Labor Content(min./shirt)		
Direct Labor Utilization		
Direct Labor Cost($/shirt)		

Mike's Plan

	Regular Shirts	Customized Shirts
Actual Cycle Time(min./shirt)	0.5	0.5
Manufacturing Lead Time(days)	2	1.91
WIP Inventory(shirts)	1920	1830
Production Capacity(shirts/day)	960.0	960.0
Capacity Utilization	93.8%	93.8%
Direct Labor Content(min./shirt)	27.01	26.01
Direct Labor Utilization	77.59%	77.59%
Direct Labor Cost($/shirt)	3.48	3.35

Ike's Plan (Regular Shirts)

	Regular Shirts
Actual Cycle Time(min./shirt)	
Manufacturing Lead Time(days)	
WIP Inventory(shirts)	
Production Capacity(shirts/day)	
Capacity Utilization	
Direct Labor Content(min./shirt)	
Direct Labor Utilization	
Direct Labor Cost($/shirt)	

Ike's Plan (Regular Shirts)

	Regular Shirts
Actual Cycle Time(min./shirt)	0.667
Manufacturing Lead Time(days)	12.583
WIP Inventory(shirts)	9060
Production Capacity(shirts/day)	720.0
Capacity Utilization	111.1%
Direct Labor Content(min./shirt)	26.51
Direct Labor Utilization	81.15%
Direct Labor Cost($/shirt)	3.43

Ike's Plan (Customized Shirts)

	Customized Shirts
Actual Cycle Time(min./shirt)	
Manufacturing Lead Time(days)	
WIP Inventory(shirts)	
Production Capacity(shirts/day)	
Capacity Utilization	
Direct Labor Content(min./shirt)	
Direct Labor Utilization	
Direct Labor Cost($/shirt)	

Ike's Plan (Customized Shirts)

	Customized Shirts
Actual Cycle Time(min./shirt)	3.900
Manufacturing Lead Time(days)	0.406
WIP Inventory(shirts)	50
Production Capacity(shirts/day)	123.1
Capacity Utilization	81.3%
Direct Labor Content(min./shirt)	26.010
Direct Labor Utilization	33.87%
Direct Labor Cost($/shirt)	7.680

Observations

- Mike's Plan (960 shirts/day) and Ike's plan (123 shirts/day) both satisfy the current requirement of customized shirts (100 shirts/day).
- Mike's plan satisfies the capacity required for regular shirts but Ike's plan does not.
- Drastic reduction of MLT in Mike's plan for regular shirts
- Indirect material handling cost will increase in Mike's plan
- Significantly high direct labor cost in Ike's plan
- Imbalance of capacity utilization in Ike's plan
- MLT of customized shirts is significantly less in Ike's plan

Discussion for Material Handlers

- Current situation: 4 material handlers
- Mike's plan:
  - Total material handling time =

  (Demand/batch size) * (number of transfers) * (Transfer time between workstations)
  - For regular/custom shirt = (900/5)*15*2 mins = 180*15*2 = 5400 mins = 5400/(8*60) ~ 12 material handlers
- Ike's plan:
  - For regular shirt = 4 material handlers
  - For custom shirts = (100/3)*15*2 mins = 1000 mins = 1000/(8*60) ~ 2 material handlers

Ike's Plan: Reorganization of Workstations

- Target cycle time to meet daily demand of 100 custom shirts: (8*60/100) = 4.8 mins

Operation	Number of Workers (Current)	Number of Workers (Ike's Plan for regular shirts)	Used labor capacity (%) in (Ike's Plan for regular shirts)
Cutting Operation	4	4	41.7%
1. Make Collar	8	7	92.9%
2. Make cuffs	4	3	111.1%
3. Make sleeves	2	1	108.3%
4. Make front	6	5	83.3%
5. Make back	4	3	94.4%
6. Join shoulders	2	1	110.0%
7. Attach collar	4	3	91.7%
8. Attach sleeves	4	3	86.1%
9. Stitch down sleeves	2	1	108.3%
10. Sew side seam	4	3	100.0%
11. Attach cuffs	4	3	86.1%
12. Hem bottom	4	3	94.4%
13. Inspect	4	3	83.3%
14.Iron	4	3	108.3%
15. Fold, Package	4	3	97.2%

Ike's Plan: Reorganization of Workstations

Operation	Regular Shirts Labor Content (Minutes per shirt)	Number of Workers	Revised Labor Content (Mins per shirt)
Cutting Operation	0.5	1	0.5
1. Make Collar	3.9	1	3.9
2. Make cuffs	2.0	1	2.7
3. Make sleeves	0.7		
4. Make front	2.5	1	4.2
5. Make back	1.7		
6. Join shoulders	0.7	1	4
7. Attach collar	1.7		
8. Attach sleeves	1.6		
9. Stitch down sleeves	0.7	1	2.5
10. Sew side seam	1.8		
11. Attach cuffs	1.6	1	3.3
12. Hem bottom	1.7		
13. Inspect	1.5		1.5
14.Iron	2.0	1	3.8
15. Fold, Package	1.8		

Cost Calculations

	Current	Mike's Plan		Ike's Plan	
	Standard	Standard	Customized	Standard	Customized
Raw material	7	7	7.7	7	7.7
Direct Labor	3.84	3.47	3.47	3.43	7.68
Indirect Matrial Handling Labor	0.24	0.64	0.64	0.24	0.96
Other Indirect Labor	0.42	0.42	0.42	0.42	0.42
Other Indirect Cost	4.5	4.5	4.5	4.5	4.5
Value of WIP	11.5	11.51	12.21	11.30	14.48
WIP	11760	1920.00	203.33	9060	50
Total value of WIP	135240	22105.60	2483.38	102332.70	724.00
Annual Carrying Cost	33810	5526.40	620.84	25583.18	181.00
Carrying Cost per Shirt	0.18	0.03	0.03	0.13	0.01
Total Cost per Shirt	16.18	16.06	16.75	15.72	21.27