

Exercise 11-1 (10 minutes)

$$\begin{aligned} 1. \text{ Margin} &= \frac{\text{Net operating income}}{\text{Sales}} \\ &= \frac{\$5,400,000}{\$18,000,000} = 30\% \end{aligned}$$

$$\begin{aligned} 2. \text{ Turnover} &= \frac{\text{Sales}}{\text{Average operating assets}} \\ &= \frac{\$18,000,000}{\$36,000,000} = 0.5 \end{aligned}$$

$$\begin{aligned} 3. \text{ ROI} &= \text{Margin} \times \text{Turnover} \\ &= 30\% \times 0.5 = 15\% \end{aligned}$$

Exercise 11-2 (10 minutes)

Average operating assets	<u>£2,200,000</u>
Net operating income	£400,000
Minimum required return:	
16% × £2,200,000	<u>352,000</u>
Residual income	<u>£ 48,000</u>

Exercise 11-3 (20 minutes)

1. Throughput time = Process time + Inspection time + Move time + Queue time
= 2.8 days + 0.5 days + 0.7 days + 4.0 days
= 8.0 days

2. Only process time is value-added time; therefore the manufacturing cycle efficiency (MCE) is:

$$\text{MCE} = \frac{\text{Value-added time}}{\text{Throughput time}} = \frac{2.8 \text{ days}}{8.0 \text{ days}} = 0.35$$

3. If the MCE is 35%, then 35% of throughput time was spent in value-added activities, the other 65% was spent in non-value-added activities.

4. Delivery cycle time = Wait time + Throughput time
= 16.0 days + 8.0 days
= 24.0 days

5. If all queue time is eliminated, then the throughput time drops to only 4 days (0.5 + 2.8 + 0.7). The MCE becomes:

$$\text{MCE} = \frac{\text{Value-added time}}{\text{Throughput time}} = \frac{2.8 \text{ days}}{4.0 \text{ days}} = 0.70$$

Thus, the MCE increases to 70%. This exercise shows quite dramatically how lean production approach can improve operations and reduce throughput time.

Problem 11-14 (30 minutes)

1.		<i>Present</i>	<i>New Line</i>	<i>Total</i>
	(1) Sales.....	\$21,000,000	\$9,000,000	\$30,000,000
	(2) Net operating income .	\$1,680,000	\$630,000 *	\$2,310,000
	(3) Operating assets	\$5,250,000	\$3,000,000	\$8,250,000
	(4) Margin (2) ÷ (1)	8.0%	7.0%	7.7%
	(5) Turnover (1) ÷ (3)	4.00	3.00	3.64
	(6) ROI (4) × (5).....	32%	21%	28%
	* Sales			\$9,000,000
	Variable expenses (65% × \$9,000,000).....			<u>5,850,000</u>
	Contribution margin.....			3,150,000
	Fixed expenses.....			<u>2,520,000</u>
	Net operating income			<u>\$ 630,000</u>

2. Fred Halloway will be inclined to reject the new product line because accepting it would reduce his division's overall rate of return.

3. The new product line promises an ROI of 21%, whereas the company's overall ROI last year was only 18%. Thus, adding the new line would increase the company's overall ROI.

4. a.		<i>Present</i>	<i>New Line</i>	<i>Total</i>
	Operating assets.....	\$5,250,000	\$3,000,000	\$8,250,000
	Minimum required return.....	<u>× 15%</u>	<u>× 15%</u>	<u>× 15%</u>
	Minimum net operating income	<u>\$787,500</u>	<u>\$450,000</u>	<u>\$1,237,500</u>
	Actual net operating income	\$1,680,000	\$ 630,000	\$2,310,000
	Minimum net operating income (above)	<u>787,500</u>	<u>450,000</u>	<u>1,237,500</u>
	Residual income.....	<u>\$ 892,500</u>	<u>\$ 180,000</u>	<u>\$1,072,500</u>

b. Under the residual income approach, Fred Halloway would be inclined to accept the new product line because adding the product line would increase the total amount of his division's residual income, as shown above.