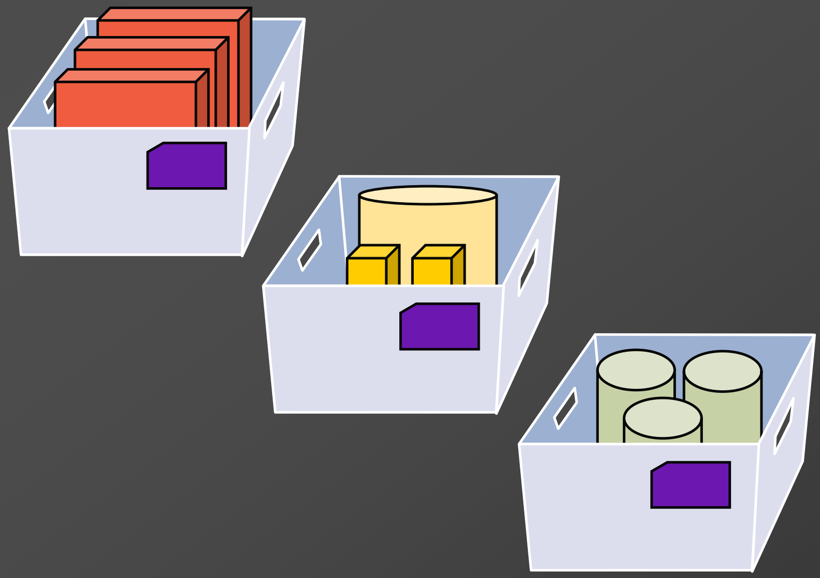
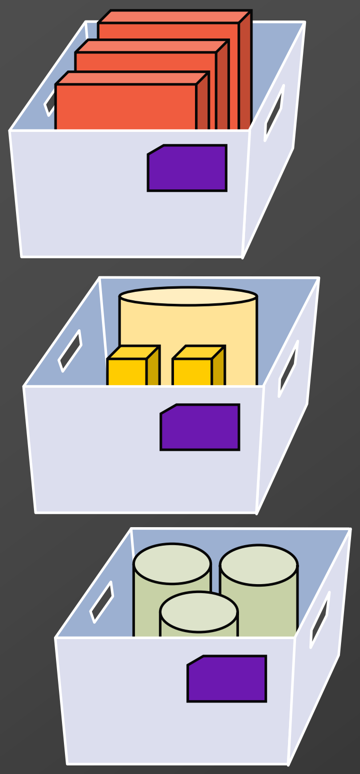
Part 3 – M.P.S.

Chapter 1 Lean Systems



Characteristics of Lean Systems

- Pull method of materials flow
- Consistent quality
- Small lot sizes
- Uniform workstation loads
- Standardized components and work methods
- Close supplier ties
- Flexible workforce
- Line flows
- Automation
- Preventive maintenance



Continuous Improvement with Lean Systems

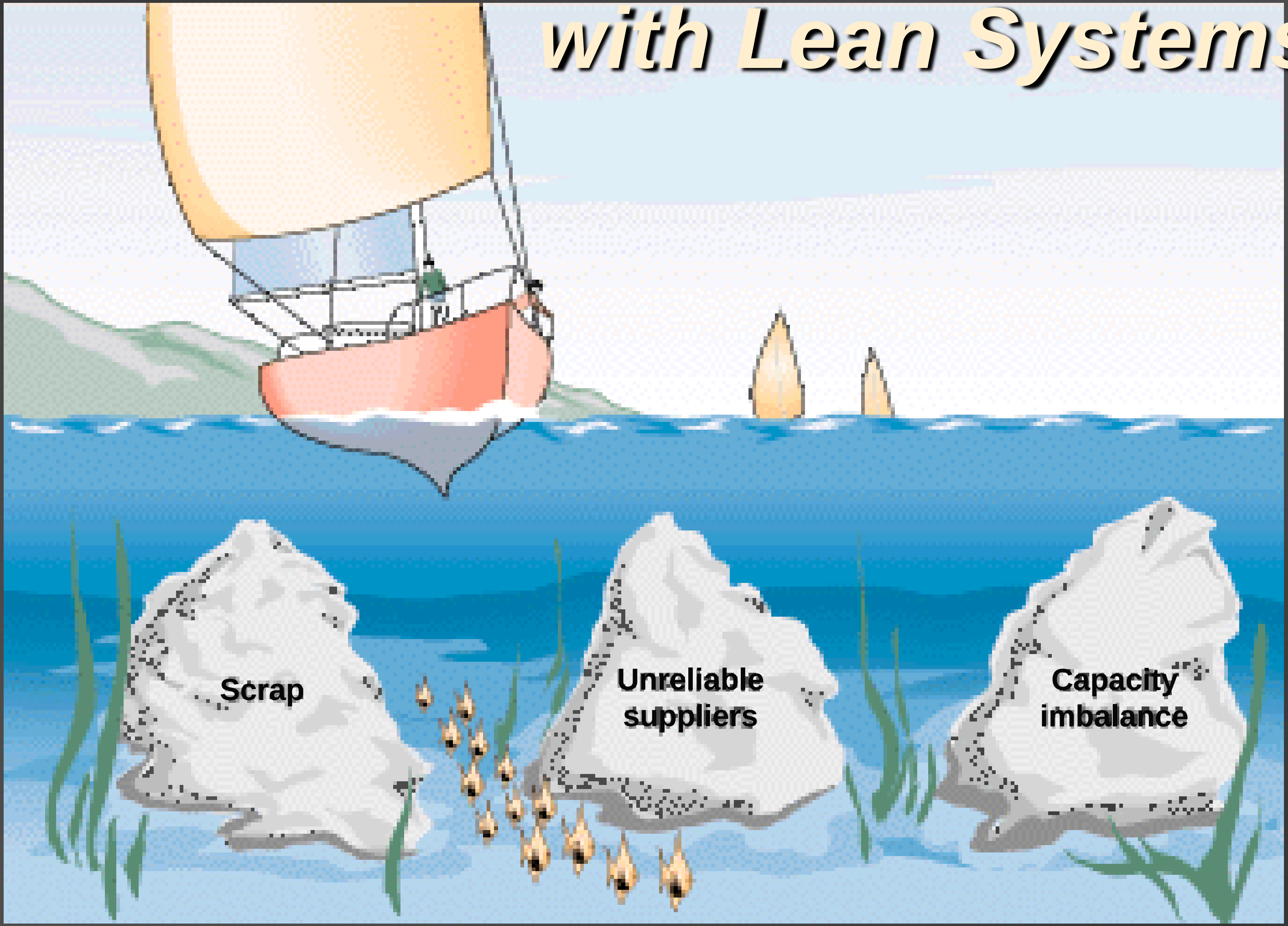


Figure 11.1

Single-Card Kanban System

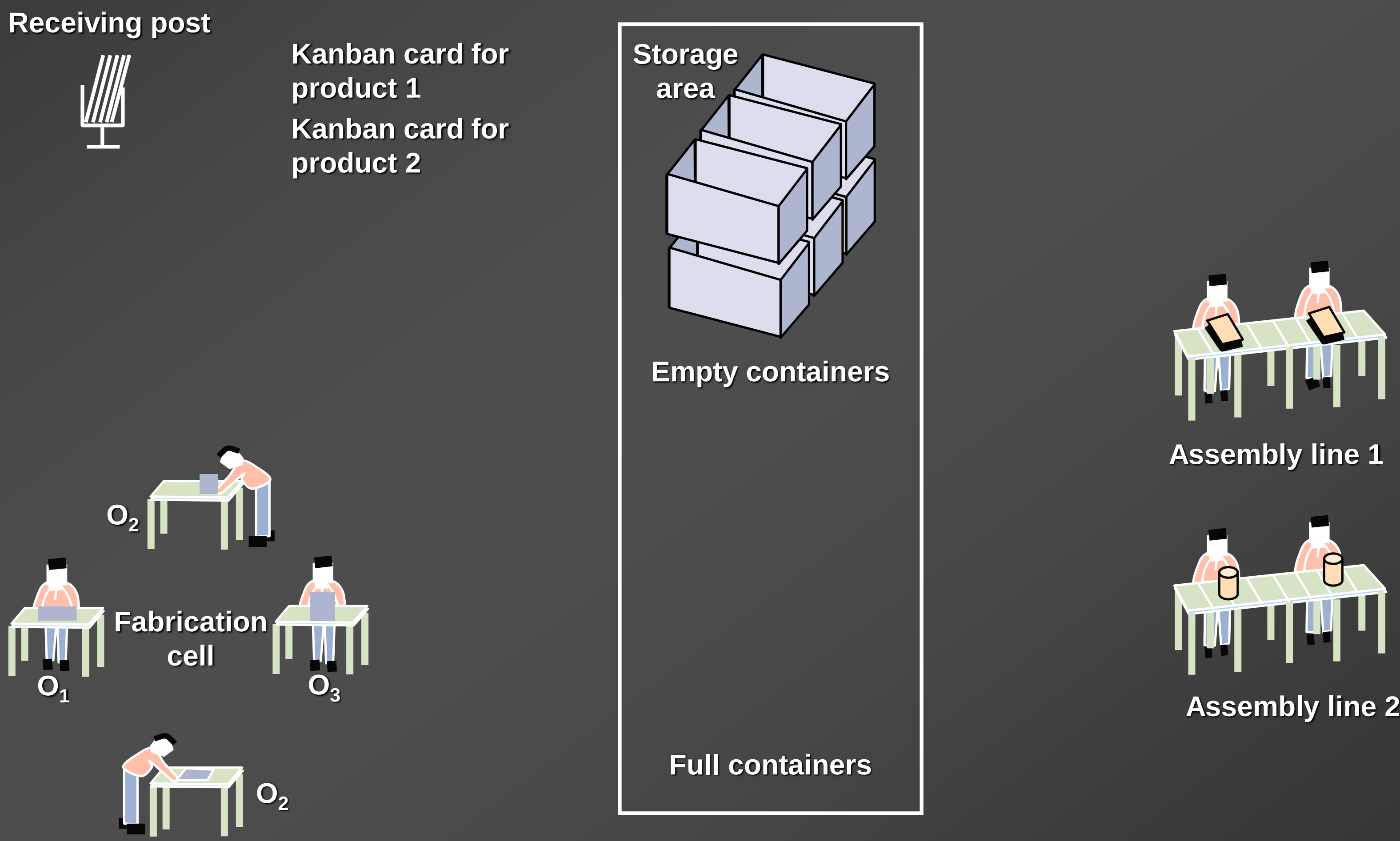


Figure 11.2

Single-Card Kanban System

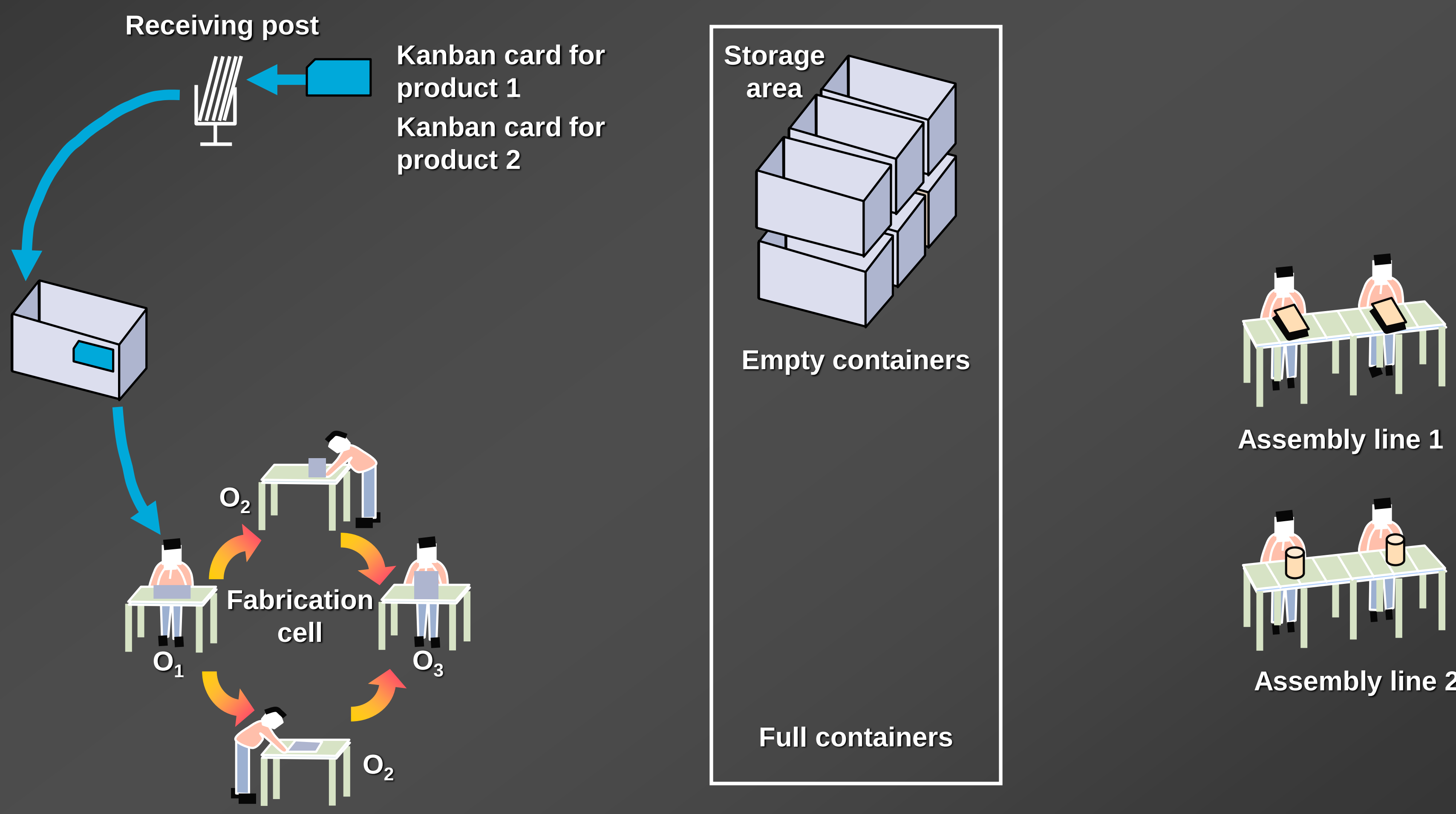


Figure 11.2

Single-Card Kanban System

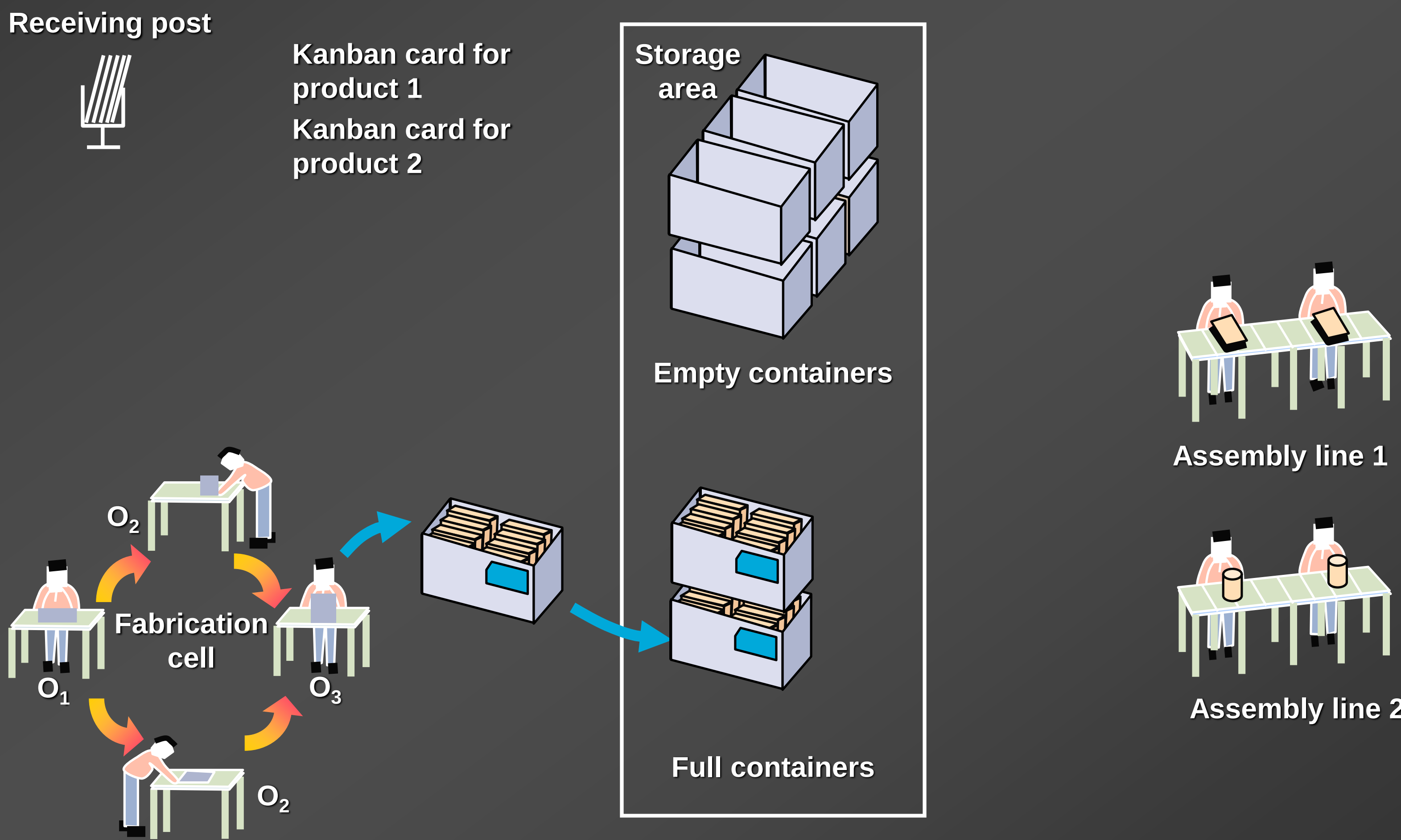
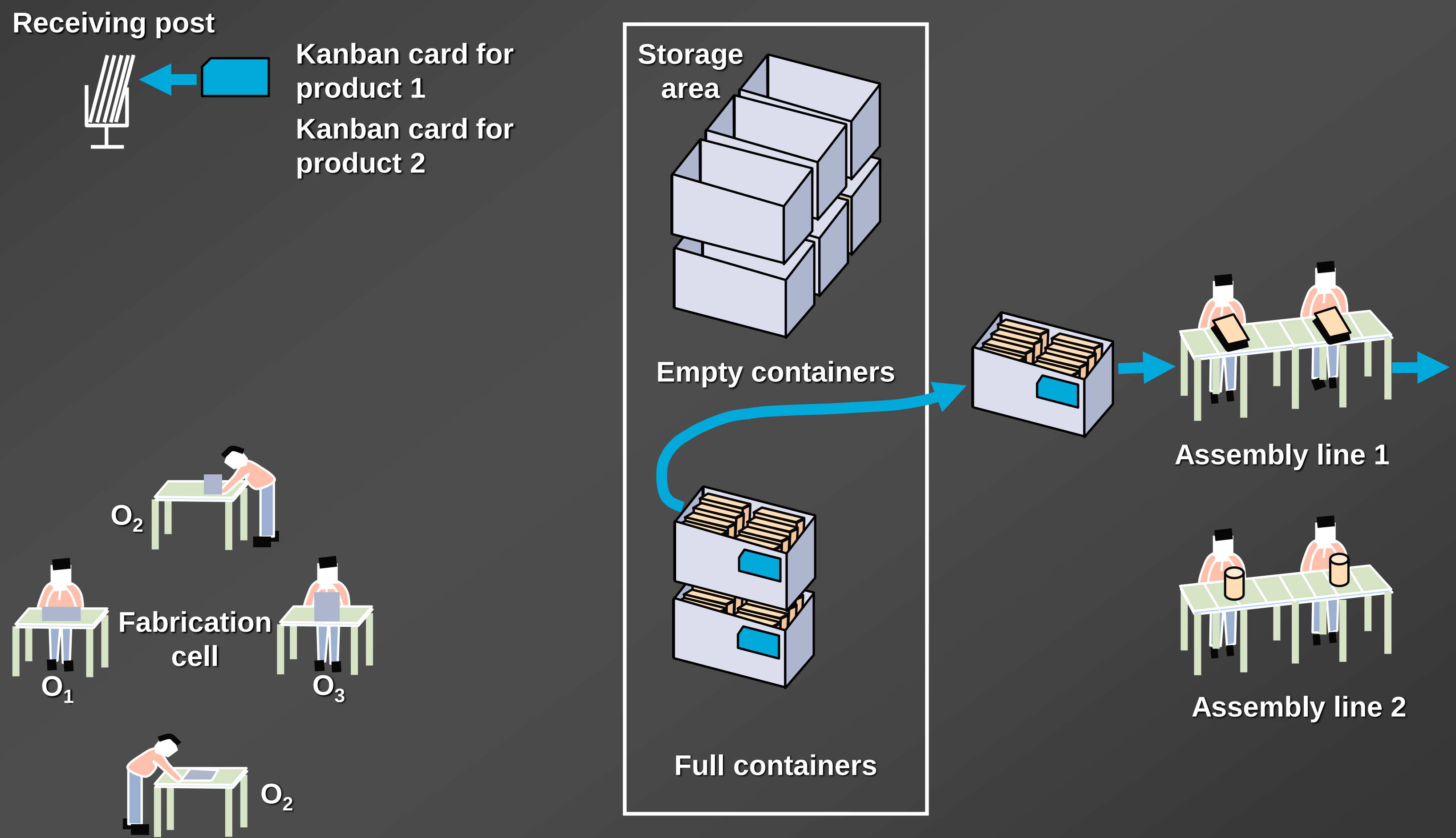


Figure 11.2

Single-Card Kanban System



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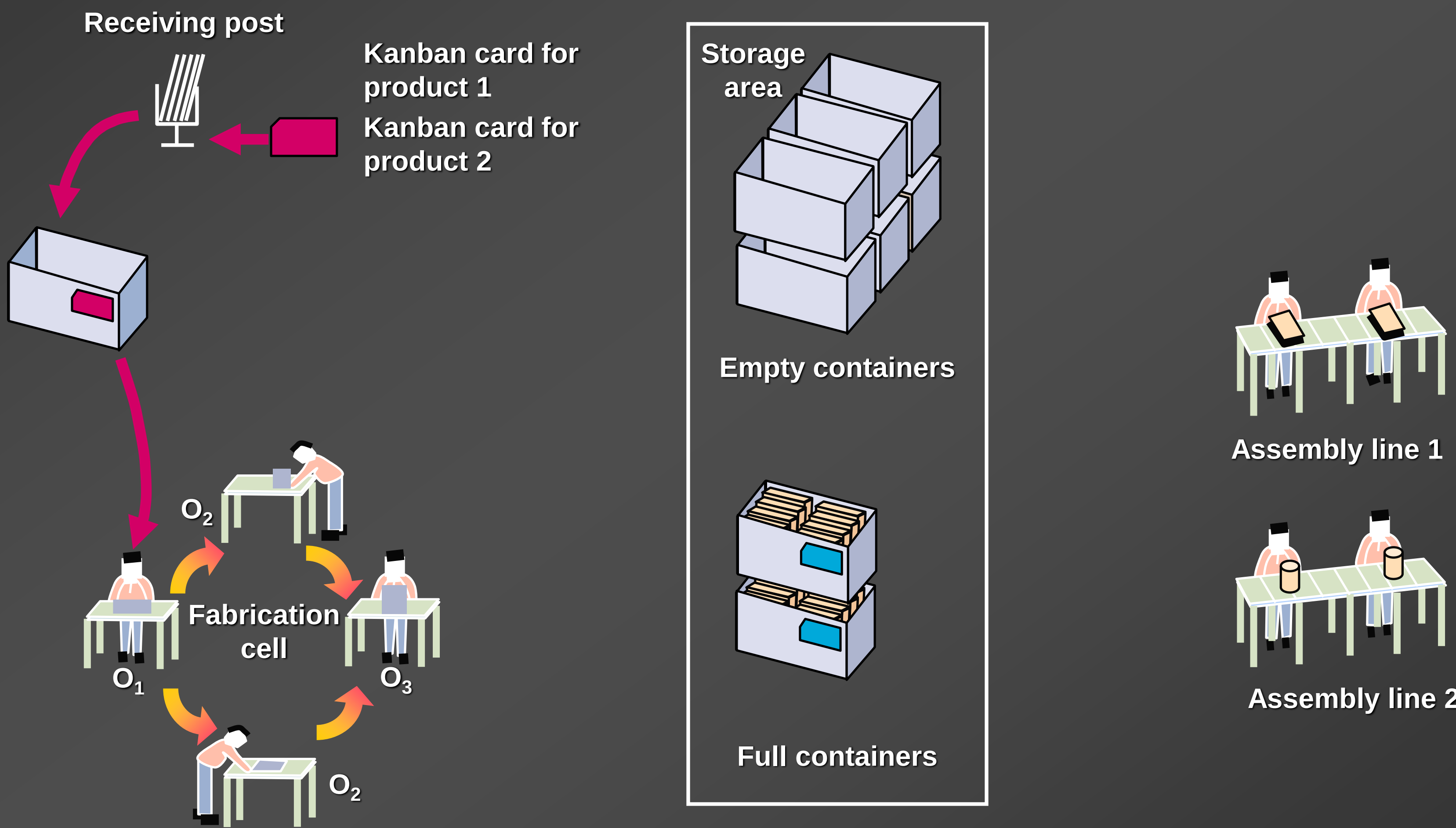
Single-Card Kanban System



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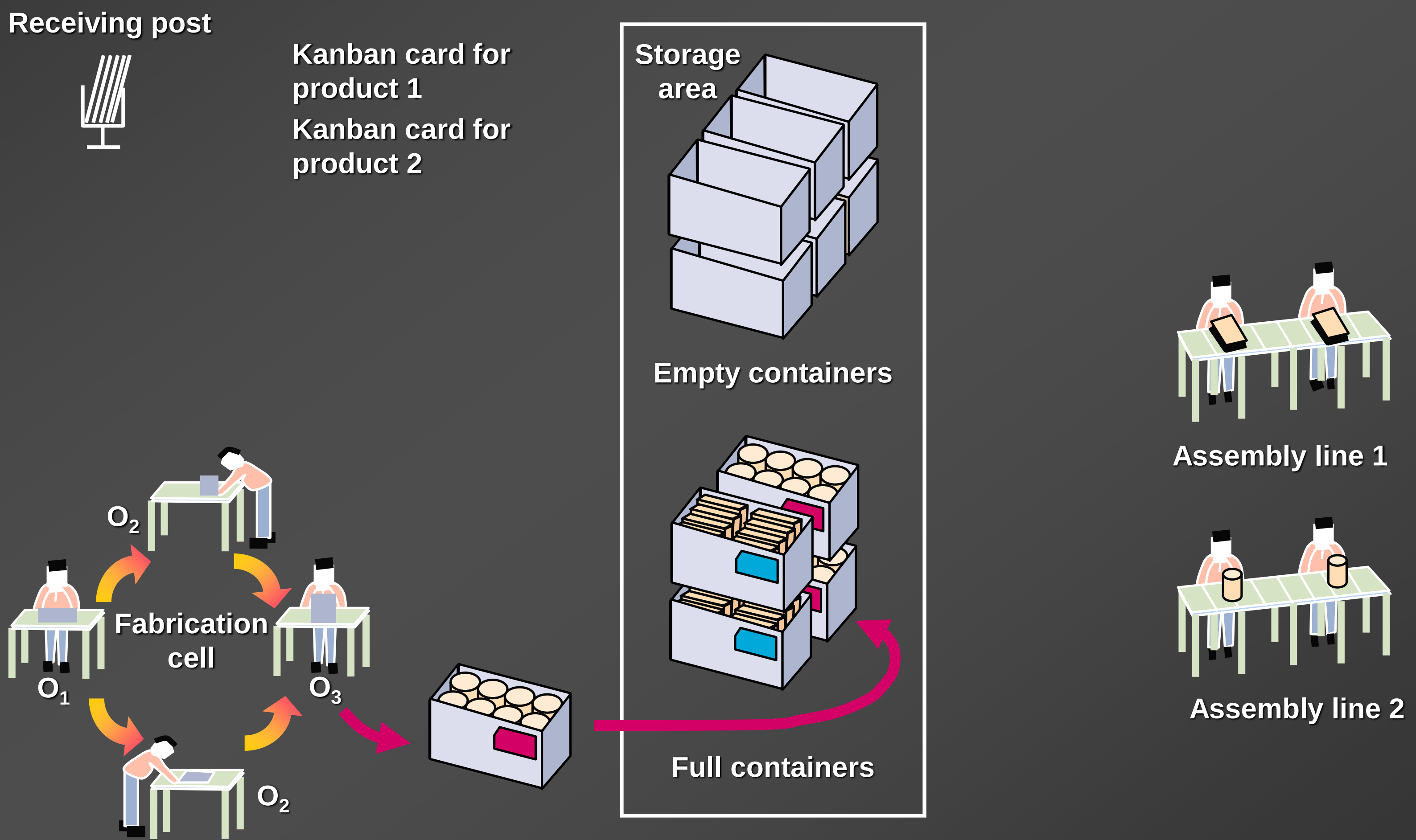
Single-Card Kanban System



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Single-Card Kanban System

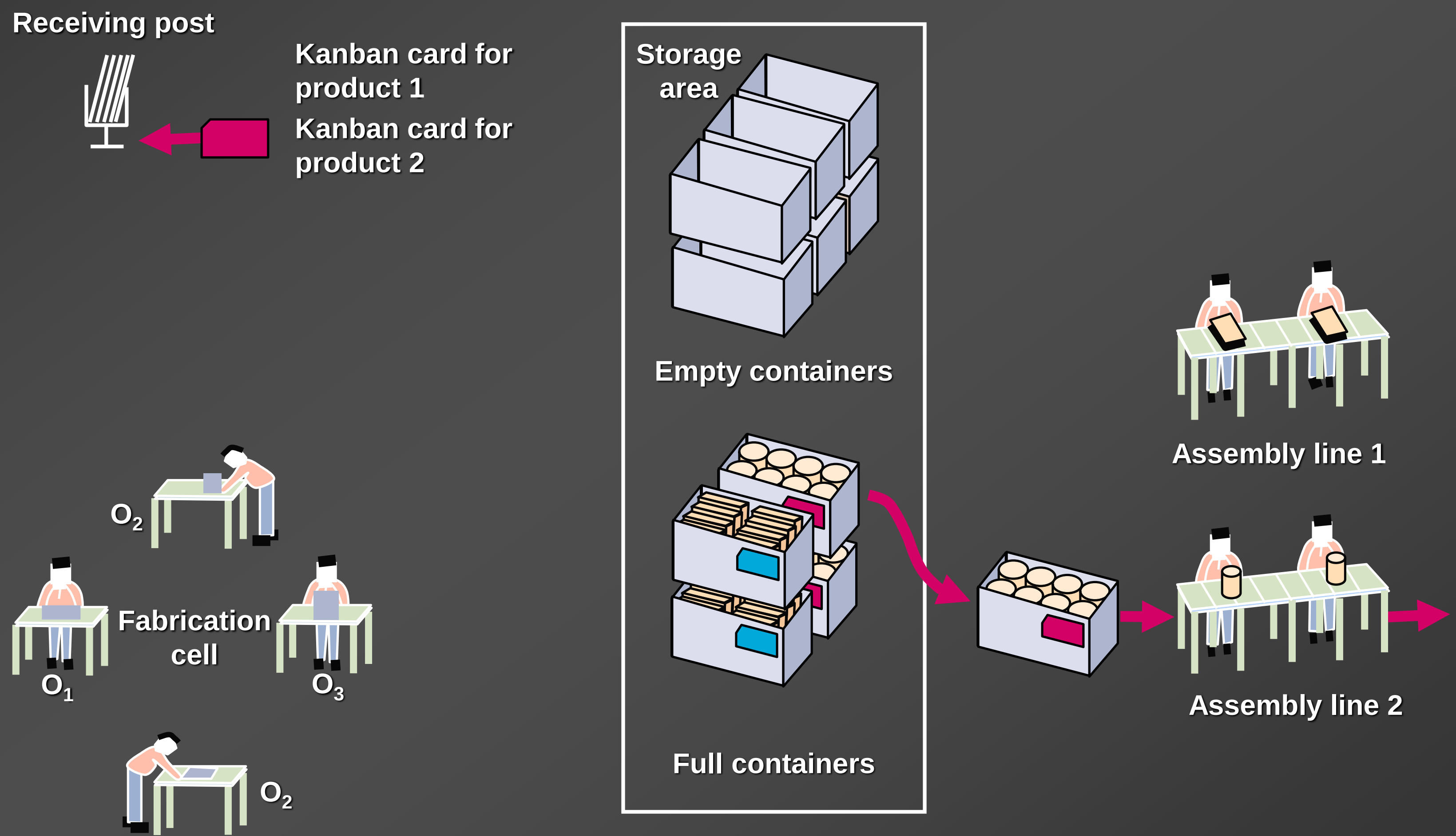


Figure 11.2

Single-Card Kanban System

- ✓ ***Each container must have a card***
- ✓ ***Assembly always withdraws from fabrication (pull system)***
- ✓ ***Containers cannot be moved without a kanban***
- ✓ ***Containers should contain the same number of parts***
- ✓ ***Only good parts are passed along***
- ✓ ***Production should not exceed authorization***

Number of Containers

Westerville Auto Parts

d = 2000 units/day $\bar{p}$ = 0.02 day α = 0.10

$\bar{w}$ = 0.08 day c = 22 units

$$k = \frac{d(\bar{w} + \bar{p})(1 + \alpha)}{c}$$

Example 11.1

Number of Containers

Westerville Auto Parts

d = 2000 units/day $\bar{p}$ = 0.02 day α = 0.10

$\bar{w}$ = 0.08 day c = 22 units

$$k = \frac{2000(\,0.08 + 0.02\,)(\,1 + 0.10\,)}{22}$$

Example 11.1

Number of Containers

Westerville Auto Parts

d = 2000 units/day $\bar{p}$ = 0.02 day α = 0.10

$\bar{w}$ = 0.08 day c = 22 units

$$k = \frac{2000(0.08 + 0.02)(1 + 0.10)}{22}$$

Example 11.1

Number of Containers

Westerville Auto Parts

d = 2000 units/day $\bar{p}$ = 0.02 day α = 0.10

$\bar{w}$ = 0.08 day c = 22 units

k = 10 containers

Example 11.1

Number of Containers

Westerville Auto Parts

d = 2000 units/day $\bar{p}$ = 0.02 day α = 0.10

$\bar{w}$ = 0.06 day c = 22 units

k = 10 containers

$$k = \frac{d(\bar{w} + \bar{p})(1 + \alpha)}{c}$$

Example 11.1

Number of Containers

Westerville Auto Parts

d = 2000 units/day $\bar{p}$ = 0.02 day α = 0.10

$\bar{w}$ = 0.06 day c = 22 units

k = 10 containers

$$k = \frac{2000(0.06 + 0.02)(1.10)}{22}$$

Example 11.1

Number of Containers

Westerville Auto Parts

d = 2000 units/day $\bar{p}$ = 0.02 day α = 0.10
$\bar{w}$ = 0.06 day c = 22 units

k = 10 containers

$$k = \frac{2000(0.06 + 0.02)(1.10)}{22}$$

Example 11.1

Number of Containers

Westerville Auto Parts

d = 2000 units/day $\bar{p}$ = 0.02 day α = 0.10

$\bar{w}$ = 0.06 day c = 22 units

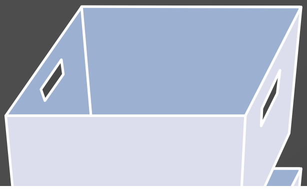
k = 10 containers

k = 8 containers

Example 11.1

Number of Containers

Westerville Auto Parts



Solver - Number of Containers

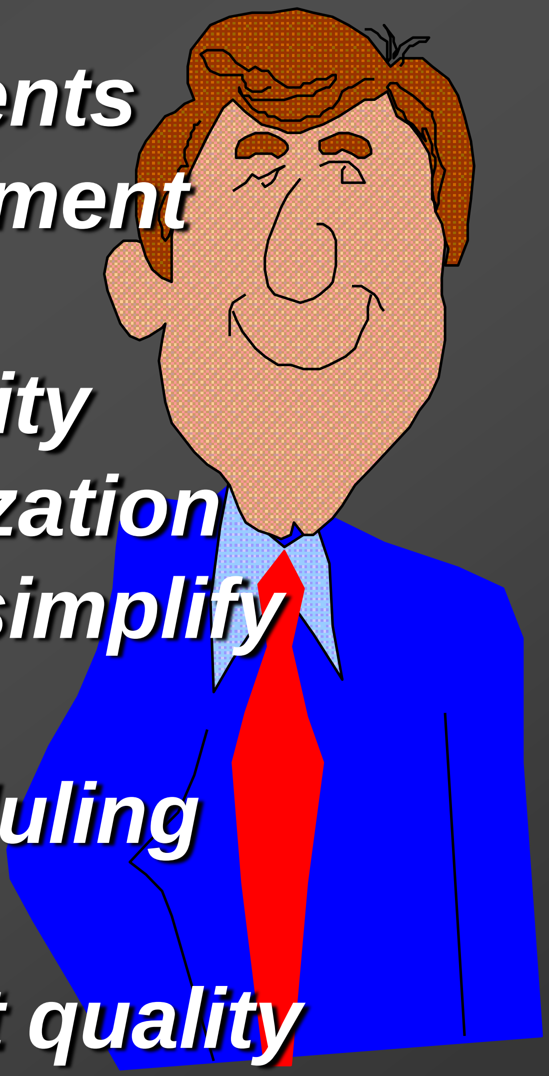
Enter data in yellow-shaded areas.

Daily Expected Demand	2000
Quantity in Standard Container	22
Container Waiting Time (days)	0.06
Processing Time (days)	0.02
Policy Variable	10%
Containers Required	8

Figure 11.3

Operational Benefits

- Reduce space requirements
- Reduce inventory investment
- Reduce lead times
- Increase labor productivity
- Increase equipment utilization
- Reduce paperwork and simplify planning systems
- Valid priorities for scheduling
- Workforce participation
- Increase service/product quality



Implementation issues

- ***Human costs of lean systems***
- ***Cooperation and trust***
- ***Reward systems and labor classifications***
- ***Process considerations***
- ***Inventory and scheduling***
- ***Schedule stability***
- ***Set-ups***
- ***Purchasing and logistics***

Problem

A company using a kanban system has an inefficient machine group. For example, the daily demand for part L105A is 3,000 units. The average waiting time for a container of parts is 0.8 day. The processing time for a container of L105A is 0.2 day, and a container holds 270 units. Currently, there are 20 containers for this item.

a. What is the value of the policy variable, a?

b. What is the total planned inventory (work-in-process and finished goods) for item L105A?

c. Suppose that the policy variable, *a*, were 0. How many containers would be needed now? What is the effect of the policy variable in this example?