Industrial Facility Design

GROUP # 06

Assignment (Question 6.13)

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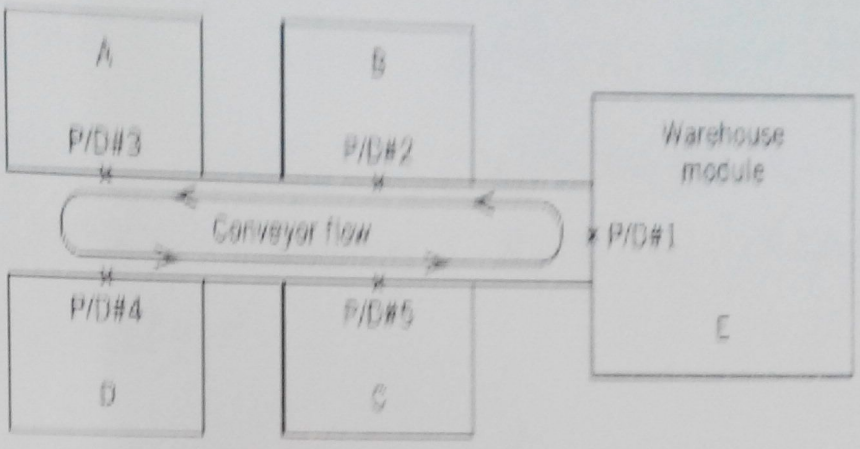
6.13 In an assembly plant, material handling between departments is performed using a one-directional closed-loop conveyor. The figure below shows the layout for the modular



facility, which consists of three equal-sized assembly modules (A, B, and C), one administrative module (D), and one warehouse module (E). P/D points for each module are also shown in the figure. The administrative and warehouse activities are not to be moved; however, assembly areas A, B, C can be relocated. The distance between P/D points and the number of pallet loads moved between departments are given below.

Distance between P/Ds

From	To	Distance
P/D 1	P/D 2	60'
P/D 2	P/D 3	90'
P/D 3	P/D 4	30'
P/D 4	P/D 5	90'
P/D 5	P/D 1	60'

Pallet Flow per Day

From/To	A	B	C	D	E
A	0	0	5	0	30
B	10	0	25	0	0
C	25	5	0	0	0
D	0	0	0	0	0
E	5	20	5	0	0

Using the pairwise exchange method, determine new locations for assembly modules A, B, and C that minimize the sum of the products of pallet flows and conveyor travel distances.

SOLUTION;

It is given that three departments (A, B, C) consist of three equal-sized assembly module. The other two departments D(administrative) and E(warehouse) are fixed in position. Only A, B, C departments can be re-located.

Given

	A	Flow	B	Flow	C
P/D ⇒	3		2		5

Flow; 1

A → P/D 3 , B → P/D 2 , C → P/D 5

Cost; = 5(120) + 30(180) + 10(90) + 25(210) + 25(210) + 5(120) + 5(150) + 20(60) + 5(270) = **21,300**

[∵ A → C = 5 and distance from A → C = P/D#3 → P/D#4 + P/D#4 → P/D#5 = 30 + 60 = 120

Flow # 02

A → P/D 2 , B to P/D 3 , C to P/D 5

Switch P/D #3 and P/D #2 (3, 2)

cost; = 5(210) + 30(270) + 10(240) + 25(120) +
5(210) + 5(60) + 20(150) + 5(60) = 22,200.

Flow # 3

A to P/D 5 , B to P/D 2 , C to P/D 3

Switch (3,5)

cost = 5(210) + 30(60) + 10(210) + 25(90) + 25(120) +
5(240) + 5(270) + 20(60) + 5(180) = 14,850.

Flow # 4.

A to P/D 3 , B to P/D 5 , C to P/D 2

Switch (2,5)

cost = 5(240) + 30(180) + 10(210) + 25(120) + 25(90) +
5(210) + 5(150) + 20(270) + 5(60) = 21,450

Flow # 5.

A to P/D 2 , B to P/D 5 , C to P/D 3

This is the 2nd iteration; as from the 1st iteration, we get lowest cost of 14,850 at iteration sequence 5 → 2 → 3

Switch (5,2).

cost = 5(90) + 30(270) + 10(120) + 25(210) + 25(240)
+ 5(120) + 5(60) + 20(270) + 5(210) = 28,350

Flow # 6

A to P/D 5 , B to P/D 3 , C to P/D 2

Switch (2,3)

cost = 5(120) + 30(60) + 10(120) + 25(240) + 25(210) +
5(90) + 5(270) + 20(150) + 5(60) = 19,950.

FINAL ASSIGNMENT:

A to PD#5 , B to PD#2 , C to PD#3 = 14,850.