



IE453 Facilities Planning

Ch 6-Section 6.4

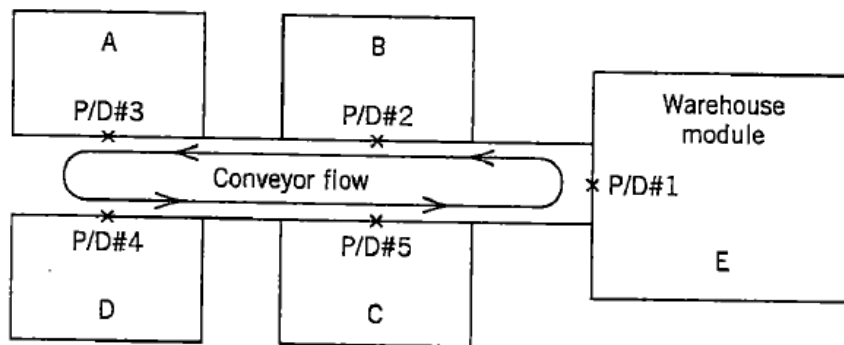
Developing a Block Layout Using Pairwise Exchange Method

6.12 Suppose five departments labeled A through E are located as shown in the layout below. Given the corresponding flow-between chart, compute the efficiency rating for the layout.

A	B
C	
D	E

	A	B	C	D	E
A	—	5	0	4	-3
B		—	6	-1	2
C			—	-6	0
D				—	3
E					—

6.13 In an assembly plant, material handling between departments is performed using a unidirectional 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.



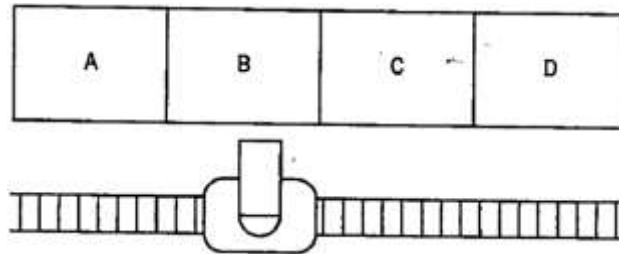
From	To	Distance
P/D 1	P/D 2	60'
P/D 2	P/D 3	90'
P/D 3	P/D 4	30'
P/D 4	P/D 5	90'
P/D 5	P/D 1	60'

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.



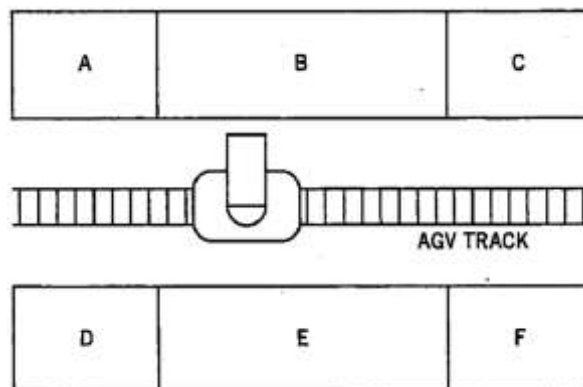
6.14. Four equal-sized machines are served by an automated guided vehicle (AGV) on a linear bidirectional track, as shown in the figure below. Each machine block is 30' X 30. The product routine information and required production rate are given in the table below. Determine a layout arrangement based on the **pairwise exchange method**. Assume that the pickup/delivery stations are located at the midpoint of the machine edge along the AGV track.



Product	Processing Sequences	Weekly Production
1	B D C A C	300 units
2	B D A C	700 units
3	D B D C A C	900 units
4	A B C A	200 units

6.15 Using the data from Problem 6.14 but assuming that the locations of the P/D points for machines A and B are 5 feet from the lower righthand corner of each machine and the P/D points for machines C and D are 10 feet from the lower-left hand corner of machines C and D, develop an improved layout using the **pairwise exchange method**.

6.16 A mobile robot is serving two cells located at either sides of the AGV track, as shown by the figure below. There are three machines placed in each cell. Given the from-to chart in the table below, find the best machine arrangements for both cells. Rearrangement is limited only to machines within each cell. Assume that the P/D point of each machine is located at the midpoint of the machine edge along the AGV track.

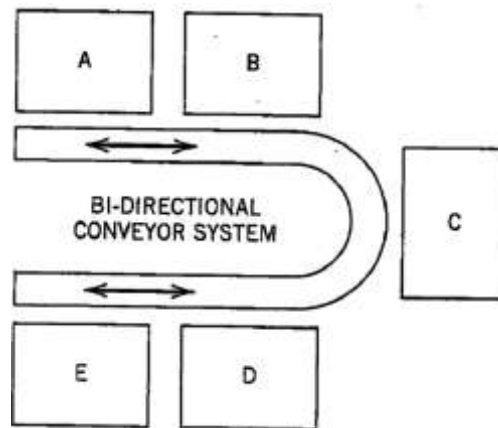




M/C	A	B	C	D	E	F
A	—	10	50	30	0	60
B	5	—	45	40	30	0
C	40	30	—	35	5	20
D	40	25	50	—	40	50
E	0	55	40	50	—	0
F	20	0	60	20	10	—

M/C	Distance	M/C	Distance
A-B	30	D-E	30
A-C	60	D-F	60
B-C	30	E-F	30

6.17 Five machines located in a manufacturing cell are arranged in a "U" configuration as shown in the layout below. The material handling system employed is a bidirectional conveyor system. Determine the best machine arrangement given the product routing information and production rates in the table.



Product	Machine Sequence	Prod. Rate
1	B-E-A-C	100
2	C-E-D	200
3	B-C-E-A-D	500
4	A-C-E-B	150
5	B-C-A	200

M/C	Distance	M/C	Distance
A-B	20'	B-D	100'
A-C	70'	B-E	120'
A-D	120'	C-D	50'
A-E	140'	C-E	70'
B-C	50'	D-E	20'