Case Study 1

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Case Study 1-1

Company AA considers purchasing the following machines for producing printed circuit boards (PCBs):

• 3 type 1 insertion machines
• 3 soldering machines
• 3 type 2 insertion machines
• 3 inspection stations

The sequence of processing the PCBs is:
Type 1 insertion - Soldering - Type 2 insertion - Inspection.

It has been estimated that the utilization
• rate of each insertion machine of type 1 is 84%,
• soldering machine is 88%,
• insertion machine type 2 is 94%,
• and inspection station is 54%.

Design different layouts of machines and discuss advantages and disadvantages of each of them.

Three machines, one of each type

Insert. 1 Soldering Inert. 2 Inspection

|          | 84% | 88% | 94% | 54% |

Utilization rate of each machine

Solution

Layout 1 Design

Conveyor 1

M11 M21 M31 M41

Conveyor 2

M12 M22 M32 M42

Conveyor 3

M13 M23 M33 M43

Dedicated transfer lines

Layout 1: Advantages and Disadvantages

Advantages:
1. Each of the three production lines is dedicated to produce one type of PCB.
2. Conveyors are used to handling PCBs, hence, handling cost is relatively low.
3. The system is relatively easy to set up.

Disadvantages:
1. Rigid material handling system.
2. This system has relatively low utilization rate.
Case Study 1-2

Six parts are to be machined on six machines as indicated in the table below, e.g., part 1 is machined in the sequence machine 2 - machine 3; part 3 is processed in the sequence machine 3 - 4 - 5 - 6.

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<thead>
<tr>
<th>Machine</th>
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<th>3</th>
<th>4</th>
<th>5</th>
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Parts 1 and 2 can be handled by an articulated arm robot, while parts 3, 4, and 5 can be handled by an AGV.

Part 6 can be handled by the robot or AGV.

Design a layout of the manufacturing system that includes the six machines.
Solution

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AGV  R

1, 2 - robot
3, 4, 5 - AGV
6 - robot or AGV

Final Design