BIG FLOOR PLANS · COLLEGE & TRADES TRACK · 50 MINUTES

Equipment Footprints and Service Clearances: teacher script

Industrial-technology and manufacturing-engineering students tape a packaging line at full size, add every service zone, the electrical panel's working space and the forklift aisle, and find the conflicts before the equipment lands.

Prep: Tape the 40 ft x 30 ft bay; mark the origin at the southwest corner (x east, y north, inches). Tape the four machine footprints from the scenario. Leave the zones, panel space and aisle for the students. Print one check sheet per team.

Min	Step and what to do	Ask	Listen for
0-5	**Hook** Walk the footprints. "These all fit. Are we done?"	What else does a machine need?	Room to run it, service it, and get to the panel; the forklift needs its aisle.
5-15	**Zones** Teams tape every service zone, the panel working space (30 in wide, 36 in deep) and the 12-ft forklift aisle.	Which color shows what?	Footprints in one color, zones in another.
15-30	**Find conflicts** Teams walk the layout and list every overlap with its size.	What overlaps?	2 conflicts, all involving the case packer.
30-42	**Fix** Teams move one machine and re-check.	Where can the case packer go?	Between the labeler and the aisle, west of the panel space.
42-46	**Use of space** Compute footprint as a share of the bay.	How much floor do the machines themselves use?	113 of 1200 sq ft, about 9%.
46-50	**Exit ticket** Individual exit ticket.		

Common misconceptions

- **Learners may think:** If the footprints don't touch, the layout works. **Address it:** Zones, panel space and aisles conflict long before footprints touch.
- **Learners may think:** Working space only matters when someone is at the panel. **Address it:** It must be kept clear at all times.

Supports

- Pre-tape the bay grid every 5 ft.
- Multilingual learners: label footprint, zone, aisle and panel on the floor with pictures.
- Mobility: one teammate can read coordinates and record seated.

References

- **NEC 110.26(A)**: working space about electrical equipment: 30 in wide or the equipment width, 3 ft deep for 0-150 V to ground (check the edition your jurisdiction adopted)
- **Perkins V (CTE)**: postsecondary and secondary CTE program context

Scenario sheet

Bay 40 ft (x, east) x 30 ft (y, north), origin at the southwest corner, inches. Rectangles are (x0, y0) to (x1, y1).

Element	From (x0, y0)	To (x1, y1)
M1 Filler	60, 60	156, 108
M2 Capper	180, 60	252, 108
M3 Labeler	300, 70	360, 110
M4 Case packer	370, 170	466, 230
M1 Filler front 36 in	60, 108	156, 144
M2 Capper front 36 in	180, 108	252, 144
M2 Capper side 30 in	252, 60	282, 108
M3 Labeler front 36 in	300, 110	360, 146
M3 Labeler side 30 in	360, 70	390, 110
Electrical panel working space (30 in wide, 36 in deep)	438, 147	474, 177
Forklift aisle (12 ft)	0, 216	480, 360

Rule as quoted: NEC 110.26(A), working space 30 in wide or the equipment width (whichever is greater) and 3 ft deep for 0-150 V to ground, kept clear. Nothing may sit in a service zone, the panel working space or the aisle.

LEARNER SHEET · EQUIPMENT FOOTPRINTS AND SERVICE CLEARANCES

Name _____ Date _____

Element	Conflicts with	Overlap x (in)	Overlap y (in)

Move one machine: new (x0, y0) _____ (x1, y1) _____ Conflicts after the move: _____

Machine footprints total _____ sq ft of a _____ sq ft bay = _____ %

Exit ticket

1. A panel is 24 in wide. How wide is its working space?

2. A machine edge sits at y = 230 and the aisle starts at y = 216. Overlap?

3. Name two zones a machine needs besides its footprint.

Answer key

Element	Conflicts with	Overlap
M4 Case packer	Panel working space 30 x 36 in	28 in x 7 in
M4 Case packer	Forklift aisle 12 ft	96 in x 14 in

Move M4 to (280, 150) to (376, 210): between the labeler zones and the aisle, west of the panel space. Conflicts after the move: 0.

Footprints: 113 sq ft of 1200 sq ft = 9%. Zones, the panel space and the aisle take far more floor than the machines.

Exit ticket

1. A panel is 24 in wide. How wide is its working space?
   Answer: 30 in: the rule is 30 in or the equipment width, whichever is greater.
2. A machine edge sits at y = 230 and the aisle starts at y = 216. Overlap?
   Answer: 14 in into the aisle.
3. Name two zones a machine needs besides its footprint.
   Answer: Operator front and service access (and any clearance its maker specifies).

Scoring: 1 point each, plus 1 for the conflict list. 3 or more = secure.

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