

Motion is Money[®]

Helping increase productivity and reduce risk.

CONSTRUCTION



CNA

We can show you more.[®]



Wasted motion decreases your workers' production and increases their risk of injury. This booklet will give you strategies, methods and ideas to enhance your workers' productivity and reduce risk factors. For every one percent reduction in risk, you can gain one percent improvement in productivity.

- Spend 30 to 60 minutes observing your workers walking, bending, reaching and climbing.
- Remember, unnecessary movement affects productivity and efficiency.
- Don't criticize during this time, but learn and then coach.

Key Questions to Ask Yourself

- How much walking did you see?
- How many bends are occurring?
- How much climbing is occurring?
- How many employees are walking to get materials and tools?
- What are the distances employees are walking?
- What percentage of materials/tools can be staged off of the floor or ground?
- How do we get materials/tools off of the floor or ground?
- Was the best type and size of ladder/lift used?
- What is the distance from the point of installation to the gang box or staging location?
- Where are the portable restrooms located?

Observations

Key factors:

Number of trips, number of minutes, per observation.

Annualize all measurements:

- Treasure hunting (looking for tools and materials)
- Distance walked (to and from gang box, lay down yard, trailer, staging point)
- Frequency of trips
- Use of ladders
- Mechanical lift
- Bending over to the floor or ground, and lifting
- Working overhead, reaching
- Body posture on ladder/lift (twisted)

Typical times it takes to:

Bend to the floor – **3 seconds**

Walk 50 paces – **30 seconds**

Climb up/down 8' ladder – **10 seconds**

Example #1

Bending Observation on a Typical Job

Bending:

Number of work days per year = 250

Number of bends performed in 1 hour = 50

50 bends x 3 seconds = 150 seconds

150 seconds x 8 hours = 1,200 seconds/60 minutes
= 20 labor minutes

20 labor minutes x 250 days = 5,000 labor minutes

5,000 /60 minutes = 83 labor hours

Total number of employees on the job = 100

83 hours x 100 employees
= 8,300 labor hours/year

Gang rate = \$ 40

8,300 labor hours x \$ 40
= \$ 332,000 cost of bending

Worksheet #1

Bending Observation on a Typical Job

Bending:

Number of work days per year =

Number of bends performed in 1 hour =

bends x 3 seconds = seconds

seconds x 8 hours = seconds/60 minutes
= **labor minutes**

labor minutes x days = labor minutes

/60 minutes = **labor hours**

Total number of employees on the job =

hours x employees
= **labor hours/year**

Gang rate = \$

labor hours x \$
= \$ **cost of bending**

Example #2

Walking Observation on a Typical Job

Walking:

Number of work days per year = 250

Number of minutes walking = 10

$$\begin{aligned}
 & 10 \text{ labor minutes} \times 250 \text{ work days} \\
 & = 2,500 \text{ minutes}/60 \\
 & = 42 \text{ labor hours}
 \end{aligned}$$

Total number of employees on the job = 100

$$\begin{aligned}
 & 42 \text{ labor hours} \times 100 \text{ employees} \\
 & = 4,200 \text{ labor hours per year}
 \end{aligned}$$

Gang rate = \$ 40

$$\begin{aligned}
 & 4,200 \text{ labor hours} \times \$ 40 \text{ gang rate} \\
 & = \$ 168,000 \text{ cost of walking}
 \end{aligned}$$

Worksheet #2

Walking Observation on a Typical Job

Walking:

Number of work days per year =

Number of minutes walking =

labor minutes x work days
 = minutes/60
 = **labor hours**

Total number of employees on job =

labor hours x employees
 = **labor hours per year**

Gang rate = \$

labor hours x \$ gang rate
 = \$ **cost of walking**

Example #3

Reaching in a Standing Position

Reaching with Arm Extended to 20":

Number of workdays per year = 280

Number of reaches performed in one hour = 100

$$\begin{aligned}
 100 \times .78 \text{ of a second} &= 78 \text{ seconds} \times 8 \text{ hours} \\
 &= 624 \text{ seconds}/60 \\
 &= 10.4 \text{ labor minutes}
 \end{aligned}$$

$$\begin{aligned}
 10.4 \text{ labor minutes} \times 280 \text{ work days} &= 2,912 \text{ labor minutes}/60 \\
 &= 48.5 \text{ labor hours}
 \end{aligned}$$

Total number of employees reaching = 50

$$\begin{aligned}
 48.5 \text{ labor hours} \times 50 \text{ employees} &= 2,426 \text{ labor hours per year}
 \end{aligned}$$

Gang rate = \$ 40 per/hour

$$\begin{aligned}
 2,426 \text{ labor hours} \times \$ 40 \text{ gang rate} &= \$ 97,040 \text{ cost of reaching in a standing position}
 \end{aligned}$$

Worksheet #3

Reaching in a Standing Position

Reaching with Arm Extended to 20":

Number of workdays per year =

Number of reaches performed in one hour =

$$\begin{aligned} \text{[]} \times .78 \text{ of a second} &= \text{[]} \text{ seconds} \times 8 \text{ hours} \\ &= \text{[]} \text{ seconds}/60 \\ &= \text{[]} \text{ labor minutes} \end{aligned}$$

$$\begin{aligned} \text{[]} \text{ labor minutes} \times \text{[]} \text{ work days} \\ &= \text{[]} \text{ labor minutes}/60 \\ &= \text{[]} \text{ labor hours} \end{aligned}$$

Total number of employees reaching =

$$\begin{aligned} \text{[]} \text{ labor hours} \times \text{[]} \text{ employees} \\ &= \text{[]} \text{ labor hours per year} \end{aligned}$$

Gang rate = \$ per/hour

$$\begin{aligned} \text{[]} \text{ labor hours} \times \$ \text{[]} \text{ gang rate} \\ = \$ \text{[]} \text{ cost of reaching in a standing position} \end{aligned}$$

Example #4

Climbing Ladders

Climbing Ladders:

Number of workdays per year = 280

Number of times ascending and descending per hour = 25

$$\begin{aligned}
 25 \times 8 \text{ seconds} &= 200 \text{ seconds} \times 8 \text{ hours} \\
 &= 1,600 \text{ seconds}/60 \\
 &= 26.7 \text{ labor minutes}
 \end{aligned}$$

$$\begin{aligned}
 26.7 \text{ labor minutes} \times 280 \text{ work days} &= 7,476 \text{ labor minutes}/60 \\
 &= 124.6 \text{ labor hours}
 \end{aligned}$$

Total number of employees climbing ladders = 50

$$\begin{aligned}
 124.6 \text{ labor hours} \times 50 \text{ employees} &= 6,230 \text{ labor hours per year}
 \end{aligned}$$

Gang rate = \$ 40 per/hour

$$\begin{aligned}
 6,230 \text{ labor hours} \times \$ 40 \text{ gang rate} &= \$ 249,200 \text{ cost of climbing ladders}
 \end{aligned}$$

Worksheet #4

Climbing Ladders

Climbing Ladders:

Number of workdays per year =

Number of times ascending and descending per hour =

$$\begin{aligned} \text{[]} \times 8 \text{ seconds} &= \text{[]} \text{ seconds} \times 8 \text{ hours} \\ &= \text{[]} \text{ seconds}/60 \\ &= \text{[]} \text{ labor minutes} \end{aligned}$$

$$\begin{aligned} \text{[]} \text{ labor minutes} \times \text{[]} \text{ work days} \\ &= \text{[]} \text{ labor minutes}/60 \\ &= \text{[]} \text{ labor hours} \end{aligned}$$

Total number of employees climbing ladders =

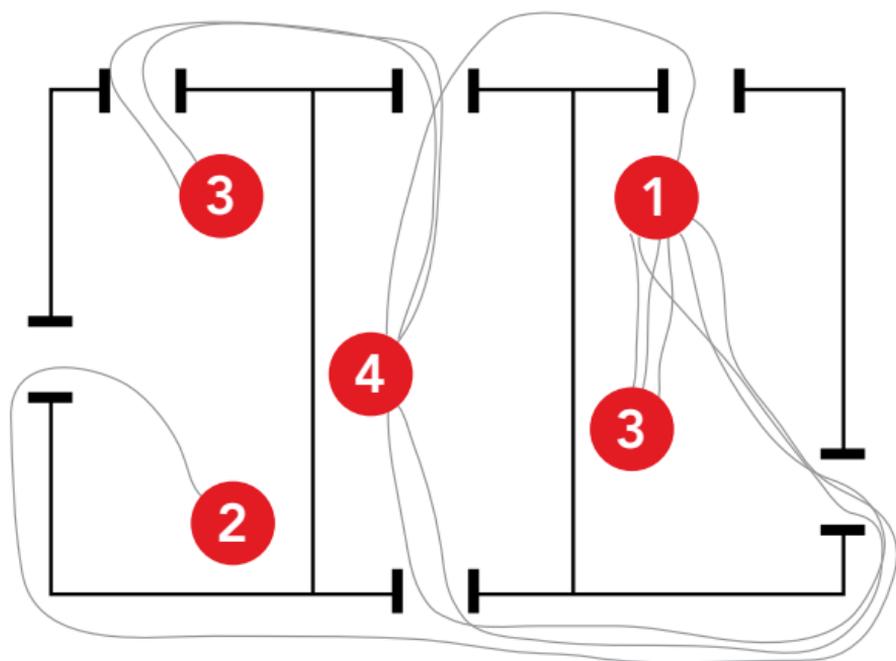
$$\begin{aligned} \text{[]} \text{ labor hours} \times \text{[]} \text{ employees} \\ &= \text{[]} \text{ labor hours per year} \end{aligned}$$

Gang rate = \$ per/hour

$$\begin{aligned} \text{[]} \text{ labor hours} \times \$ \text{[]} \text{ gang rate} \\ &= \$ \text{[]} \text{ cost of climbing ladders} \end{aligned}$$

Spaghetti Chart

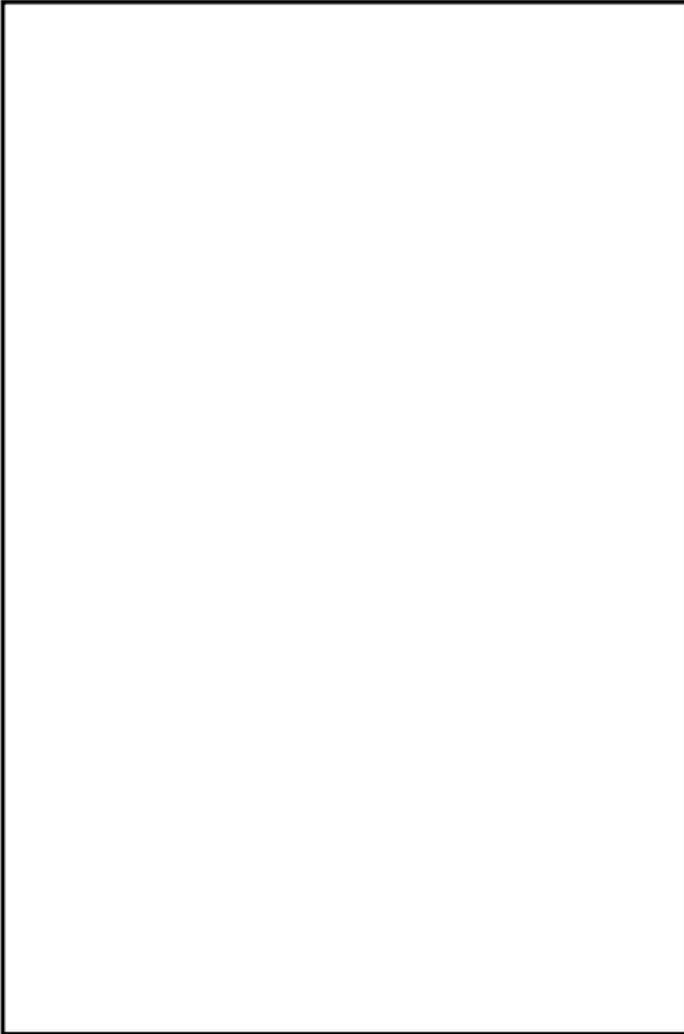
A Spaghetti Chart is a method of focusing on the movement of your employees and determining if there is excess walking or movement. This is a visual method of showing wasted motion.



- 1 Point of Installation
- 2 Material Storage
- 3 Tools
- 4 Gang Box

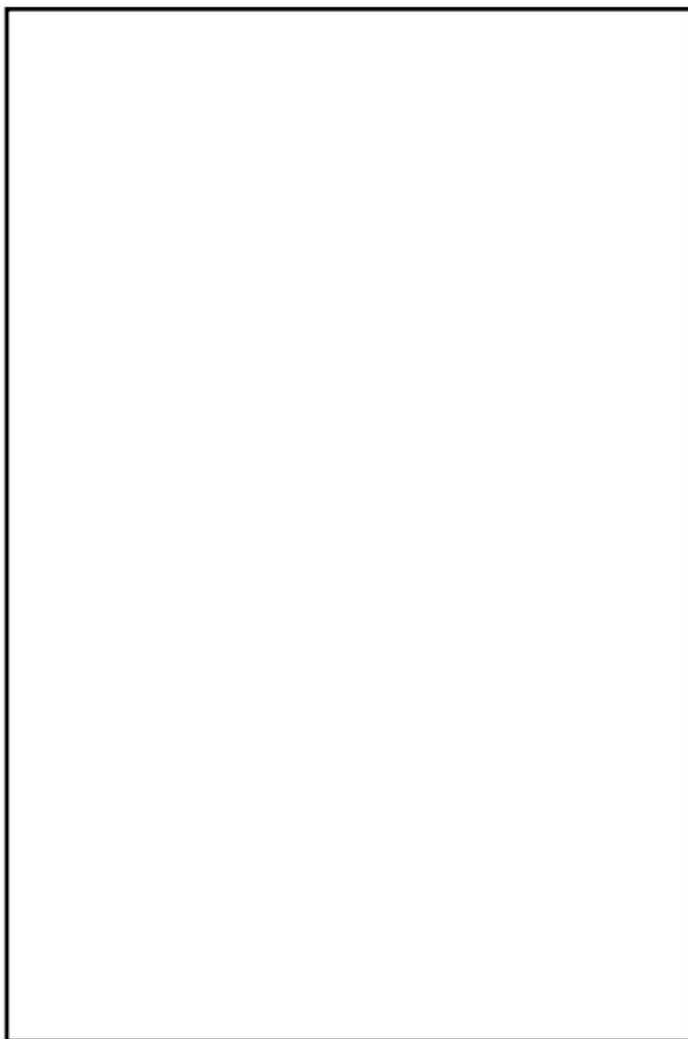
Spaghetti Chart

Use this space to observe workplace movement.



Spaghetti Chart

Use this space to observe workplace movement.



Key Points to Remember

- Remember to annualize all numbers.
- Pre-planning must include the human interface.



Common Conversions

60 seconds = 1 minute

3,600 seconds = 1 hour

28,800 seconds = 8-hour day

60 minutes = 1 hour

480 minutes = 8-hour day

19,200 minutes = 40-hour week

10 bends = 30 seconds

50 paces walking = 30 seconds

Up/Down 8' ladder = 10 seconds





For more information,
visit www.cna.com/riskcontrol.



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