

Welding  
Duty Cycle Worksheet

Name

Key

1. Find the operating time for a machine with a 20% duty cycle at 100 amps.

2 minutes

$$\begin{aligned} &20\% * 10 \text{ min} \\ &= .2 * 10 \\ &= 2 \end{aligned}$$

2. Find the operating time for a machine with a 60% duty cycle at 350 amps.

6 minutes

$$\begin{aligned} &60\% * 10 \text{ min} \\ &= .6 * 10 \\ &= 6 \end{aligned}$$

3. Find the operating time for a machine with a 60% duty cycle at 200 amps.

6 minutes

$$\begin{aligned} &60\% * 10 \text{ min} \\ &= .6 * 10 \\ &= 6 \end{aligned}$$

4. A \$45 item is on sale for 20% off. Sales tax is 6%. How much is the item going to cost?

\$38.16

$$\begin{aligned} &100\% - 20\% = 80\% \\ &.8 (45) \\ &= \$36 \end{aligned}$$

$$\begin{aligned} &100\% + 6\% \text{ sales tax} = 106\% \\ &1.06 (36) \\ &= \$38.16 \end{aligned}$$

5. A \$250 item is on sale for 30% off. As an employee, you get a 15% discount as well. Sales tax is 6%. How much is the item going to cost?

\$157.68

$$\begin{aligned} &100\% - 30\% = 70\% \\ &.7 (250) \\ &= 175 \end{aligned}$$

$$\begin{aligned} &100\% - 15\% = 85\% \\ &.85 (175) \\ &= 148.75 \end{aligned}$$

$$\begin{aligned} &100\% + 6\% = 106\% \\ &1.06 (148.75) \\ &= \$157.68 \end{aligned}$$

6. A bill at a restaurant is \$25.95 with tax. How much money should you leave for a 15% tip?

\$3.89

$$\begin{aligned} &15\% * 25.95 \\ &= .15 (25.95) \\ &= 3.89 \end{aligned}$$

7. If you have a machine rated 60% at 150 amps and need to work at 250 amps, how long will you be able to operate the machine with it overheating?

2 minutes

$$\begin{aligned} &60\% \left( \frac{150}{250} \right)^2 \\ &= .6 (.6)^2 \\ &= .6 (.36) \\ &= .216 \\ &= 22\% \end{aligned}$$

$$\begin{aligned} &22\% * 10 \text{ min} \\ &= 2.2 \end{aligned}$$

8. If you have a machine rated 60% at 100 amps and only need 80 amps for the job, how long will you be able to operate the machine before burning out the transformer?

$$60\% \left(\frac{100}{80}\right)^2$$

$$.6(1.25)^2$$

$$.6(1.5625)$$

$$.9375$$

$$94\%$$

$$94\% * 10 \text{ min}$$

$$9.4$$

9 minutes

9. If you have a machine rated 90% at 120 amps and need to work at 175 amps for the job, how long will you be able to operate the machine before burning out the transformer?

$$90\% \left(\frac{120}{175}\right)^2$$

$$.9(.6857)^2$$

$$.9(.4702) = .423$$

$$42\%$$

$$42\% * 10 \text{ min}$$

$$4.2$$

4 minutes

10. If you have a machine rated 90% at 175 amps and need to work at 225 amps for the job, how long will you be able to operate the machine before burning out the transformer?

$$90\% \left(\frac{175}{225}\right)^2$$

$$.9(.7)^2$$

$$.9(.49)$$

$$.54 = 54\%$$

$$54\% * 10 \text{ min}$$

$$5.4$$

5 minutes

11. There are two welding machines in a shop. One has a duty cycle rating of 60% at 135 amperage while the other machine has a 90% duty cycle at 150 amps. You are planning a job that needs to operate at 195 amps and need to get it done as soon as possible. Which machine should you use? Show your work and give an explanation.

Machine 1

$$60\% \left(\frac{135}{195}\right)^2$$

$$.6(.6923)^2$$

$$.6(.4793)$$

$$.2876$$

$$29\%$$

$$29\% * 10 \text{ min}$$

$$2.9$$

$$2 \text{ min}$$

Machine 2

$$90\% \left(\frac{150}{195}\right)^2$$

$$.9(.7692)^2$$

$$.9(.5917)$$

$$.5325$$

$$53\%$$

$$53\% * 10 \text{ min} = .53 * 10 = 5 \text{ min}$$

Machine 2 90% at 150  
amps because you  
can work longer  
before it overheats.

12. There are two welding machines in a shop. One has a duty cycle rating of 60% at 150 amperage while the other machine has a 100% duty cycle at 125 amps. You are planning a job that needs to operate at 175 amps and need to get it done as soon as possible. Which machine should you use? Show your work and give an explanation.

Machine 1

$$60\% \left(\frac{150}{175}\right)^2$$

$$.6(.8571)^2$$

$$.6(.7347)$$

$$.4408$$

$$44\%$$

$$.44 * 10 \text{ min} = 4.4$$

$$4 \text{ min}$$

Machine 2

$$100\% \left(\frac{125}{175}\right)^2$$

$$1(.7143)^2$$

$$1(.5102)$$

$$.5102$$

$$51\%$$

$$.51 * 10 \text{ min} = 5.1$$

$$5 \text{ min}$$

Machine 2  
100% at 125 amps  
because you can  
work longer before  
it overheats.