# Chapter 4: Engineering Communication

**4.14** Plot the following data. Use two different y-axes. Use a scale of zero to 100°F for temperature, and zero to 12 mph for wind speed. Present your work using the ideas discussed in this chapter and engineering papers.

| Time (p.m.) | Temperature (°F) | Wind Speed (mph) |
|---|---|---|
| 1 | 75 | 4 |
| 2 | 80 | 5 |
| 3 | 82 | 8 |
| 4 | 82 | 5 |
| 5 | 78 | 5 |
| 6 | 75 | 4 |
| 7 | 70 | 3 |
| 8 | 68 | 3 |

**SOLUTION**

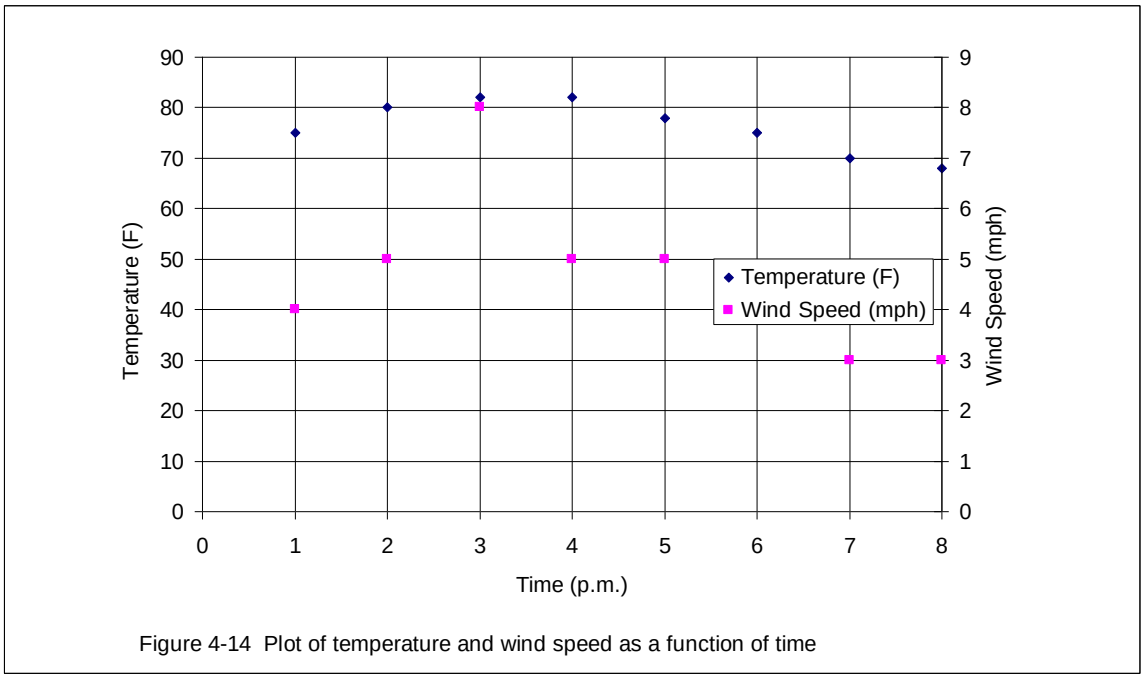


Figure 4-14 Plot of temperature and wind speed as a function of time

**4. 15** Create a table that shows the relationship between the units of temperature in degree Celsius and Fahrenheit in the range of -50° to 50°C. Use Increments of 10°C. Present your work using the ideas discussed in this chapter and engineering paper.

## SOLUTION

Table 4.15 The relationship between the units of temperature in degrees Celsius and Fahrenheit

| Temperature (°C) | Temperature (°F) |
|---|---|
| -50 | -58 |
| -45 | -49 |
| -40 | -40 |
| -35 | -31 |
| -30 | -22 |
| -25 | -13 |
| -20 | -4 |
| -15 | 5 |
| -10 | 14 |
| -5 | 23 |
| 0 | 32 |
| 5 | 41 |
| 10 | 50 |
| 15 | 59 |
| 20 | 68 |
| 25 | 77 |
| 30 | 86 |
| 35 | 95 |
| 40 | 104 |
| 45 | 113 |
| 50 | 122 |

**4.16** Create a table that shows the relationship between the units of mass in kilogram and pound mass in the range of 50 kg to 120 kg. Use increments of 10 kg. Present your work using the ideas discussed in this chapter and engineering paper.

**SOLUTION**

Table 4.16 The relationship between the units of mass in kilograms and pound mass

| mass (kg) | mass ($lb_m$) |
|---|---|
| 50 | 110.2 |
| 60 | 132.3 |
| 70 | 154.3 |
| 80 | 176.4 |
| 90 | 198.4 |
| 100 | 220.5 |
| 110 | 242.5 |
| 120 | 264.6 |

**4.17** Plot the following data: a model known as *stopping sight distance* is used by civil engineers to design roadways. This simple model estimates the distance a driver needs in order to stop his car traveling at a certain speed after detecting an hazard. Present your work using the ideas discussed in this chapter and engineering papers.

**SOLUTION**

| Speed (mph) | Speed (ft/s) | Stopping Sight Distance (ft) |
|---|---|---|
| 0 | 0.0 | 0 |
| 5 | 7.3 | 21 |
| 10 | 14.7 | 47 |
| 15 | 22.0 | 78 |
| 20 | 29.3 | 114 |
| 25 | 36.7 | 155 |
| 30 | 44.0 | 201 |
| 35 | 51.3 | 252 |
| 40 | 58.7 | 309 |
| 45 | 66.0 | 370 |
| 50 | 73.3 | 436 |
| 55 | 80.7 | 508 |
| 60 | 88.0 | 584 |
| 65 | 95.3 | 666 |
| 70 | 102.7 | 753 |
| 75 | 110.0 | 844 |
| 80 | 117.3 | 941 |

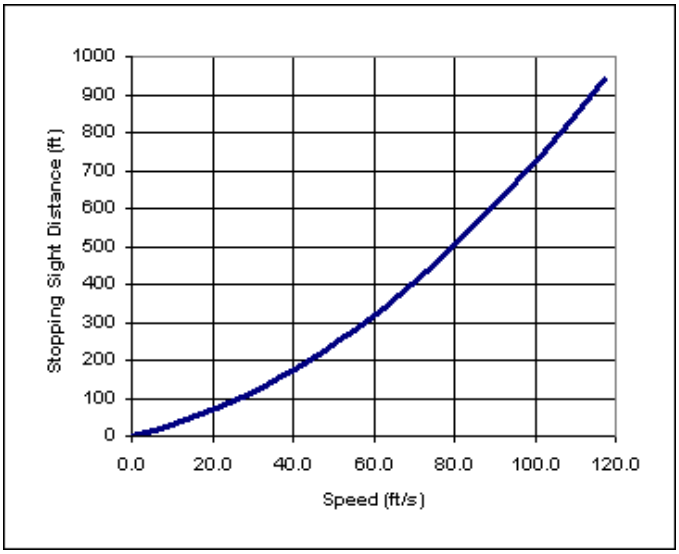


Figure 4.17 The stopping sight distance for a car traveling up to speed of 80 mph.

**4.18** Plot the following data: the velocity distribution for a flow of a fluid inside a pipe with a radius of 0.1 m is given below. Present your work using the ideas discussed in this chapter and engineering papers.

**SOLUTION**

| r | u(r) |
|---|---|
| -0.1 | 0 |
| -0.09 | 0.095 |
| -0.08 | 0.18 |
| -0.07 | 0.255 |
| -0.06 | 0.32 |
| -0.05 | 0.375 |
| -0.04 | 0.42 |
| -0.03 | 0.455 |
| -0.02 | 0.48 |
| -0.01 | 0.495 |
| 0 | 0.5 |
| 0.01 | 0.495 |
| 0.02 | 0.48 |
| 0.03 | 0.455 |
| 0.04 | 0.42 |
| 0.05 | 0.375 |
| 0.06 | 0.32 |
| 0.07 | 0.255 |
| 0.08 | 0.18 |
| 0.09 | 0.095 |
| 0.1 | 0 |

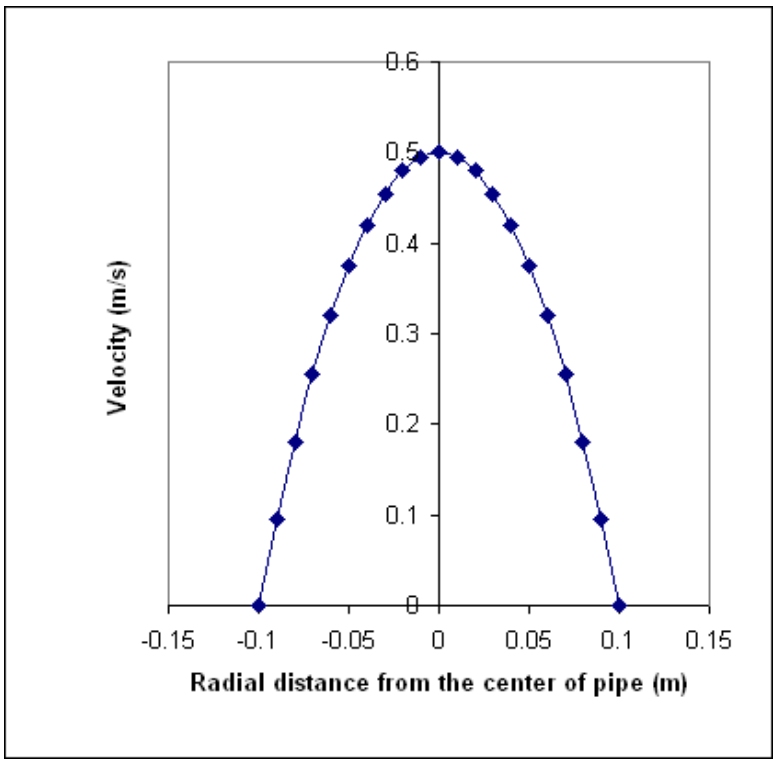


Figure 4.18 A fluid velocity distribution inside a pipe.

**4.19** Plot the following data: Inn an annealing process – a process wherein materials such as glass and metal are heated to high temperatures and then cooled slowly to toughen them —thin steel plates are heated to temperatures of 900ºC and then cooled in an environment with temperature of 35ºC. Present your work using the ideas discussed in this chapter and engineering paper.

**SOLUTION**

| Time (hr) | Temperature (°C) |
|---|---|
| | |
| 0 | 900 |
| 0.2 | 722 |
| 0.4 | 580 |
| 0.6 | 468 |
| 0.8 | 379 |
| 1 | 308 |
| 1.2 | 252 |
| 1.4 | 207 |
| 1.6 | 172 |
| 1.8 | 143 |
| 2 | 121 |
| 2.2 | 103 |
| 2.4 | 89 |
| 2.6 | 78 |
| 2.8 | 69 |
| 3 | 62 |
| 3.2 | 57 |
| 3.4 | 52 |
| 3.6 | 49 |
| 3.8 | 46 |
| 4 | 44 |
| 4.2 | 42 |
| 4.4 | 40 |
| 4.6 | 39 |
| 4.8 | 38 |
| 5 | 38 |

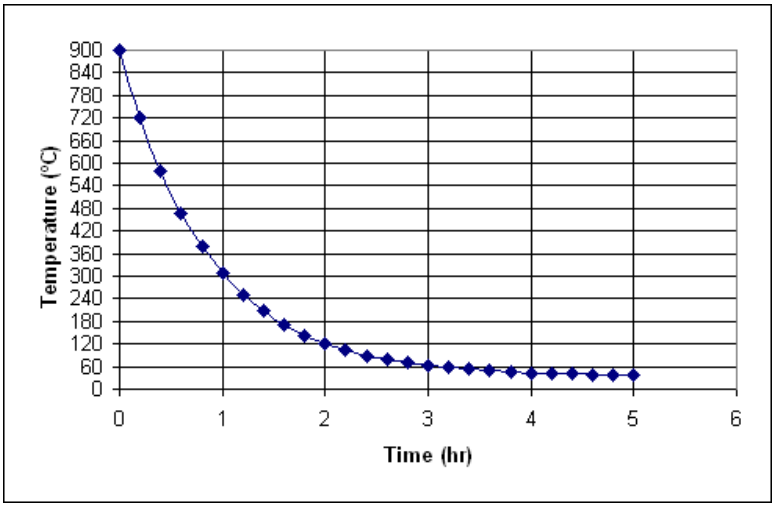


Figure 4.19 The cooling of a piece of metal

**4.20** Plot the following data: the relationship between spring force and its deflection is given below. Present your work using the ideas discussed in this chapter and engineering paper.

**SOLUTION**

| *X* (mm) | *F* (N) |
|---|---|
| 0 | 0 |
| 5 | 10 |
| 10 | 20 |
| 15 | 30 |
| 20 | 40 |

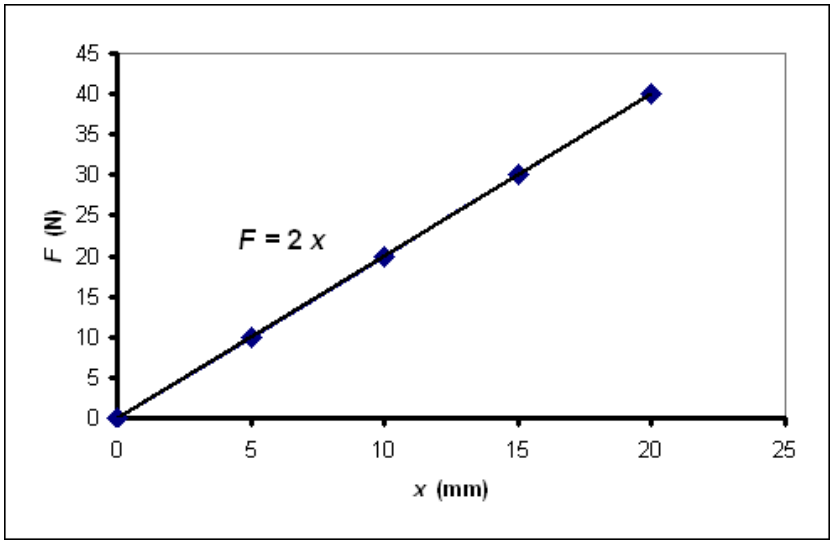


Figure 4.20 The relationship between a spring force and its deflection