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A GUIDE TO SIX SIGMA AND PROCESS IMPROVEMENT FOR PRACTITIONERS AND STUDENTS

Second Edition

Foundations, DMAIC, Tools, Cases, and Certification

A Guide to Six Sigma and Process Improvement for Practitioners and Students

Second Edition

Using Minitab for the C Chart

To illustrate how to obtain a c chart, refer to the data in Table 5.3 concerning the number of add-ons in an outpatient clinic. Open the **ADDONS.MPJ** worksheet and follow these steps:

1. Select **Stat | Control Charts | Attribute Charts | C**. In the C Chart dialog box (see Figure 5.33), enter **C2** or **ADDONS** in the Variables edit box.

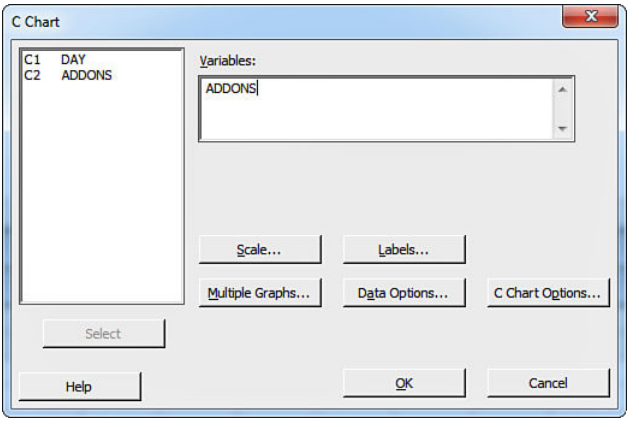

Figure 5.33 Minitab C Chart dialog box

2. Click the **C Chart Options** button. In the C Chart: Options dialog box, click the **Tests** tab. Select **Perform All Tests for Special Causes** from the drop-down list. Click **OK** to return to the C Chart dialog box. (These values stay intact until Minitab is restarted.) Click **OK** to obtain the c chart.
3. If there are points that should be omitted when estimating the center line and control limits, click the **Estimate** tab in the C Chart: Options dialog box. Enter the points to be omitted in the edit box shown. Click **OK** to return to the C Chart dialog box.

Figure 5.34 shows the output for the c chart.

Using Minitab for the U Chart

To illustrate how to obtain a u chart, refer to the data in Table 5.4 concerning the number of patient falls in a hospital. Open the **FALLS.MPJ** worksheet and perform these steps:

1. Select **Stat | Control Charts | Attribute Charts | U**. In the U Chart dialog box (see Figure 5.35), enter **C3** or **FALLS** in the Variables edit box. In the Subgroup Sizes drop-down list box, select **Indicator Column** and enter **C2** or **CENSUS** in the edit box.

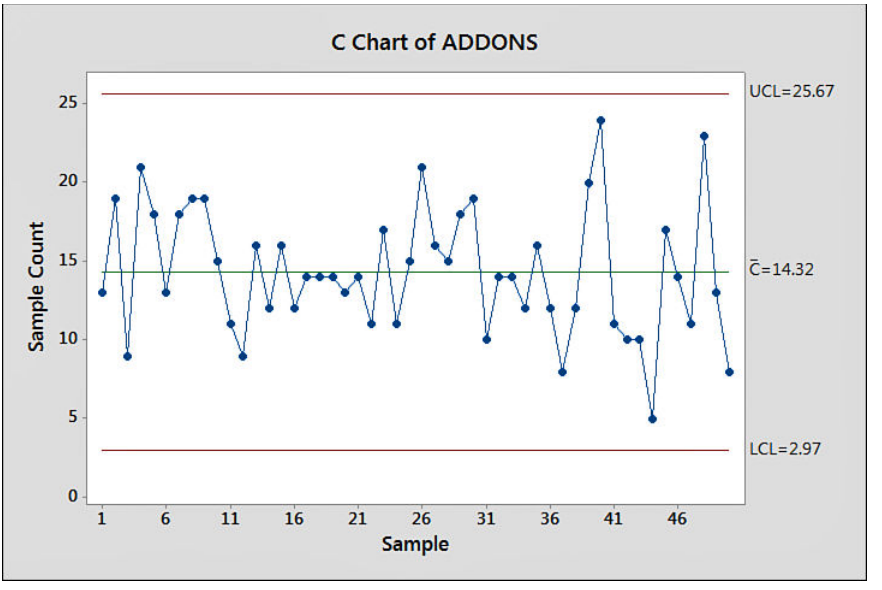

Figure 5.34 Minitab output for the c chart

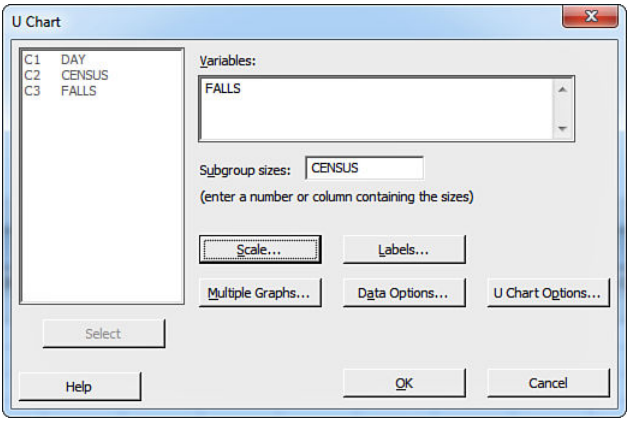

Figure 5.35 Minitab U Chart dialog box

2. In the U Chart: Options dialog box, click the **Tests** tab. Select the **Perform All Tests for Special Causes** from the drop-down list. Click **OK** to return to the U Chart dialog box. (These values stay intact until Minitab is restarted.) Click **OK** to obtain the U chart.

3. If there are points that should be omitted when estimating the center line and control limits, click the **Estimate** tab in the U Chart: Options dialog box. Enter the points to be omitted in the edit box shown. Click **OK** to return to the U Chart dialog box.

Figure 5.36 shows the output for the u chart.

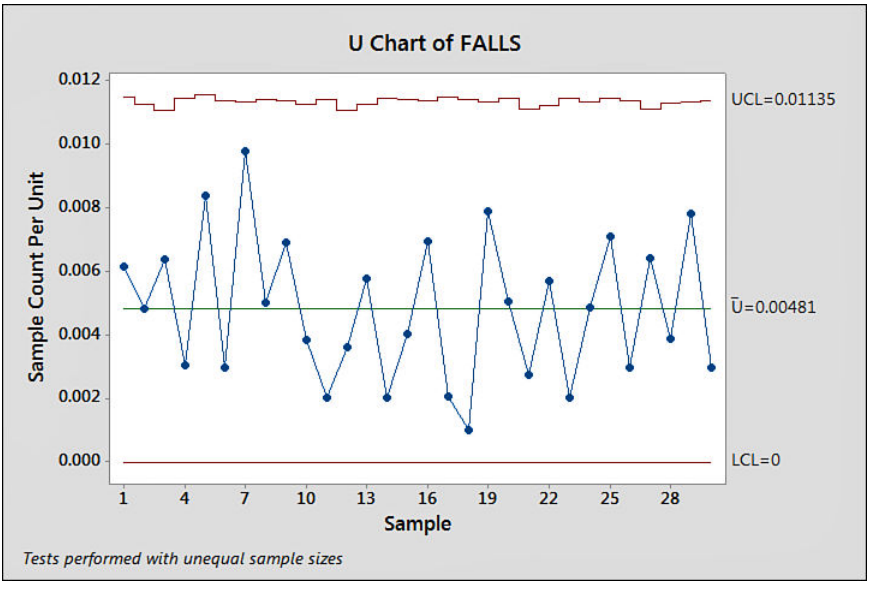

Figure 5.36 Minitab output for the u chart

Using Minitab for the Individual Value and Moving Range Charts

Individual Value and Moving Range charts can be obtained from Minitab by selecting **Stat | Control Charts | Variable Charts for Individuals | I-MR** from the menu bar. To illustrate how to obtain Individual Value and Moving Range charts, refer to the data in Table 5.5 concerning the turnaround times of GI biopsies. Open the **TURNAROUND.MPJ** worksheet and follow these steps:

1. Select **Stat | Control Charts | Variable Charts for Individuals | I-MR**. In the Individuals-Moving Range Chart dialog box (see Figure 5.37), enter **'GI BIOPSY TURNAROUND TIMES'** in the Variables edit box. Click the I-MR Options button.
2. In the I-MR Chart: Options dialog box, click the **Tests** tab. Select **Perform All Tests for Special Causes** from the drop-down list. Click **OK** to return to the I-MR Chart dialog box. (These values stay intact until Minitab is restarted.)

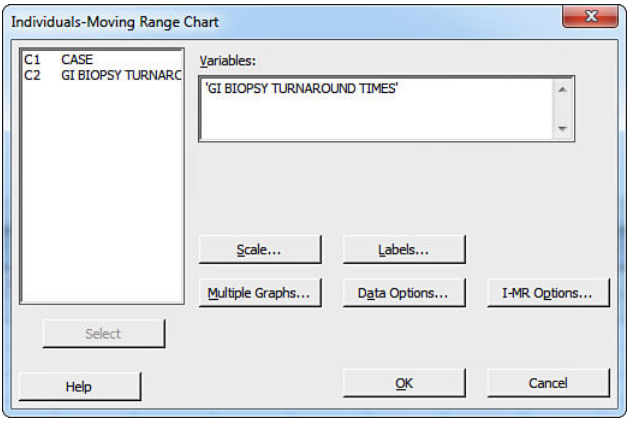

Figure 5.37 Minitab I-MR Chart dialog box

3. If there are points that should be omitted when estimating the center line and control limits, click the **Estimate** tab in the I-MR Chart: Options dialog box. Enter the points to be omitted in the edit box shown. Click **OK** to return to the I-MR Chart dialog box. (Note: When obtaining more than one set of Individual Value and Moving Range charts in the same session, be sure to reset the values of the points to be omitted before obtaining new charts.)
4. In the I-MR Chart dialog box, click **OK** to obtain the individual value and moving range charts.

Figure 5.38 shows the output for the I-MR chart.

Using Minitab for the X Bar and R Charts

X Bar and R charts can be obtained from Minitab by selecting Stat | Control Charts | Variable Charts for Subgroups | Xbar-R from the menu bar. The format for entering the variable name is different, depending on whether the data are stacked down a single column or unstacked across a set of columns with the data for each time period located in a single row. If the data for the variable of interest are stacked down a single column, choose All Observations for a Chart Are in One Column from the drop-down list and enter the variable name in the edit box below. If the subgroups are unstacked with each row representing the data for a single time period, choose Observations for a Subgroup Are in One Row of Columns from the drop-down list and enter the variable names for the data in the edit box below.

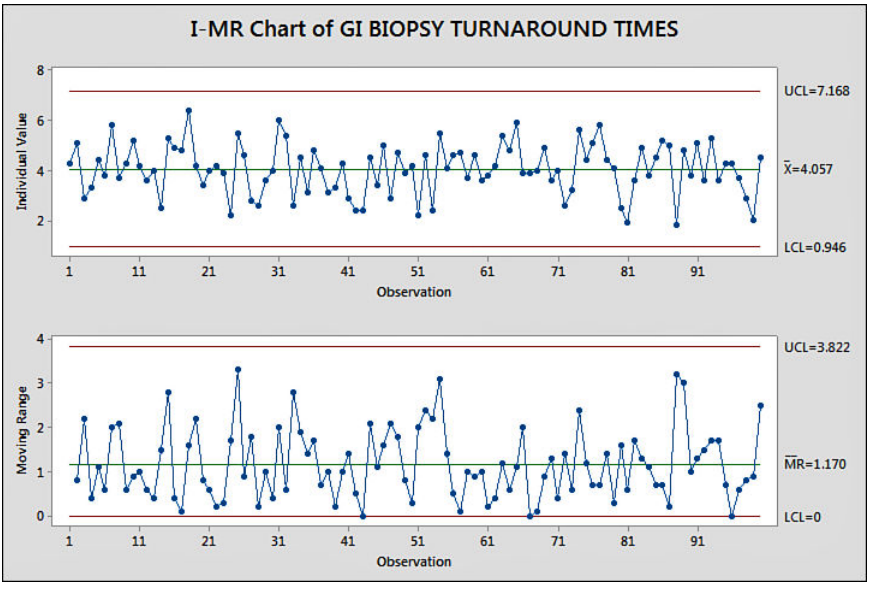

Figure 5.38 Minitab output for the I-MR chart

To illustrate how to obtain X Bar and R charts, refer to the data in Table 5.6 concerning the weight of vials. Open the **VIALS.MPJ** worksheet and follow these steps:

1. Select **Stat | Control Charts | Variable Charts for Subgroups | Xbar-R**. In the Xbar-R Chart dialog box (see Figure 5.39) enter **C3** or **'1'**, **C4** or **'2'**, **C5** or **'3'**, **C6** or **'4'**, **C7** or **'5'**, and **C8** or **'6'**, in the edit box. Click the **Xbar-R Options** button.

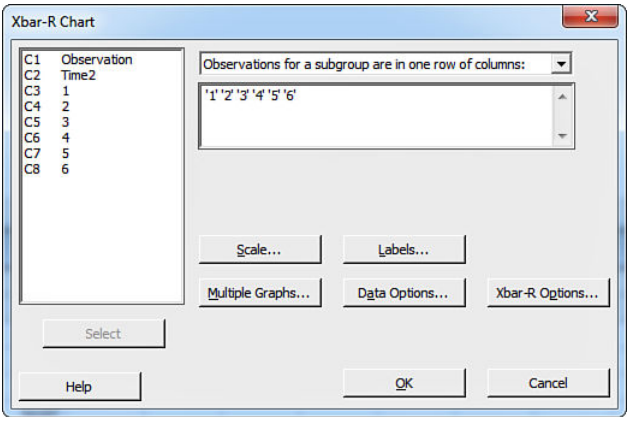

Figure 5.39 Minitab Xbar-R Chart dialog box

2. In the Xbar-R Chart: Options dialog box (see Figure 5.40), click the **Tests** tab. Select the **Perform All Tests for Special Causes** from the drop-down list. Click **OK** to return to the Xbar-R Chart dialog box. (These values stay intact until Minitab is restarted.)

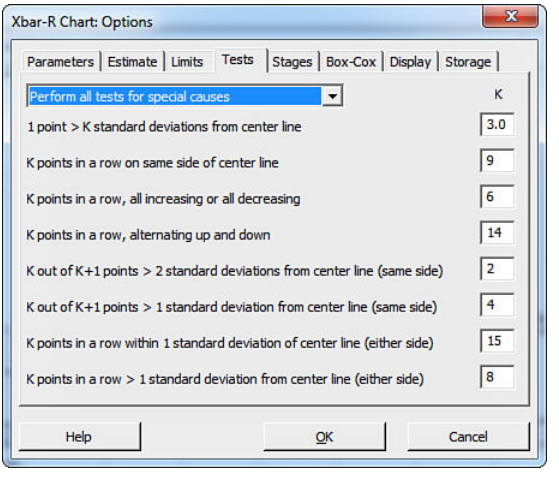

Figure 5.40 Minitab Xbar-R Chart: Options dialog box, Tests tab

3. If there are points that should be omitted when estimating the center line and control limits, click the **Estimate** tab in the Xbar-R Chart: Options dialog box (see Figure 5.41). Enter the points to be omitted in the edit box shown. Click **OK** to return to the Xbar-R Chart dialog box. (Note: When obtaining more than one set of X Bar and R charts in the same session, be sure to reset the values of the points to be omitted before obtaining new charts.)
4. In the Xbar-R Chart dialog box, click **OK** to obtain the X Bar and R charts.

Figure 5.42 shows the output for the X Bar and R chart.

Using Minitab for the X Bar and S Charts

X Bar and S charts can be obtained from Minitab by selecting **Stat | Control Charts | Variable Charts for Subgroups | Xbar-S** from the menu bar. The format for entering the variable name is different, depending on whether the data are stacked down a single column or unstacked across a set of columns with the data for each time period located in a single row. If the data for the variable of interest are stacked down a single column, choose **All Observations for a Chart Are in One Column** from the drop-down list and enter the variable name in the edit box below. If the subgroups are unstacked with each row representing the data for a single time period, choose **Observations for a Subgroup Are in One Row of Columns** from the drop-down list and enter the variable names for the data in the edit box below.