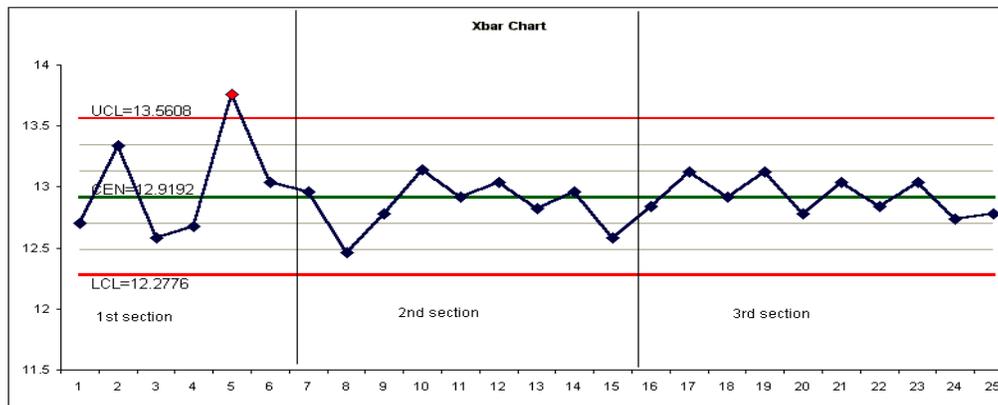


Analysis of the Control Chart

Once a control chart is made, it is even more important to understand how to interpret them and realize when there is a problem. All processes have some kind of variation and this process variation can be partitioned into two main components. First there is natural process variation, frequently called "**common cause**" or **system variation**. These are common variations caused by machines, material and the natural flow of the process.

Second is **special cause variation**, generally caused by some problem or extraordinary occurrence in the system. It is our job to work at trying to eliminate or minimize both of these types of variation. Below is an example of a few different process variations and how to recognize a potential problem.



There are three divided sections in the above chart. The **first section** is termed "out of statistical control" for several reasons. Notice the inconsistent plot points and that one point is outside of the control limits. This means that a source of special cause variation is present; it needs to be analyzed and resolved. Having a point outside the control limits is usually the most easily detectable condition. There is almost always an associated cause that can be easily traced to some malfunction in the process.

In the **second section**, even though the process is now in control, it is not really a smooth flowing process. All the points lie within the control limits and thus exhibit only common cause variations.

In the **third section** you will notice that the trending is more predictable and smoother flowing. It is in this section that there is evidence of process improvement and the variation has been reduced.

Therefore, to summarize, eliminating special cause variation keeps the process in control; process improvement reduces the process variation, and moves the control limits in toward the centerline of the process. There are a few more terms listed below that you need to become familiar with when analyzing an Xbar Chart and the process:

- **RUN** - When several plotted points line up consecutively on one side of a Central Line (CL), whether it is located above or below the CL it is called a "run". If there are 7 points in a row on one side of the CL, there is an abnormality in the process and it requires an adjustment.

- **TREND** - If there is a continued rise or fall in a series of points (like an upward or downward slant) it is considered a "trend" and usually indicates a process is drifting out of control. This usually requires a machine adjustment.
- **PERIODICITY** - If the plotted points show the same pattern of change over equal intervals it is called "periodicity". It looks much like a uniform roller coaster of the same size ups and downs around the centerline. This process should be watched closely as something is causing a defined uniform drift to both sides of the centerline.
- **HUGGING** - When the points on the control chart seem to stick close to the center line or to a control limit line it is called "hugging of the control line". This usually indicates that a different type of data or data from different factors (or lines) have been mixed into the sub groupings. To determine if you are experiencing "hugging" of the control line, perform the following exercise. Draw a line equal distance between the centerline and the upper control limit. Then draw another line equal distance between the center line and the lower control limit. If the points remain inside of these new lines, there is an abnormality and the process needs closer analysis.

Source: <http://thequalityweb.com/control.html>