Overview of Total Quality Tools

Lecture 7

Total Quality Tools Defined

- Total quality tools enable today's employees, whether engineers, technologists, production workers, managers, or office staff, to do their jobs. Virtually no one can function in an organization that has embraced total quality without some or all of these tools.

- Seven tools will be discussed in this chapter. A case can be made that *just-in-time (JIT), statistical process control,* and *quality function deployment are total quality tools. But* these are more than tools: They are complete systems under the total quality umbrella.

Total Quality Tools Defined

- A tool exists to help do a job. If the job includes *continual improvement , problem solving, or decision* making, then these seven tools fit the definition. Each of these tools is some form of chart for the collection and display of specific kinds of data.

- Through the collection and display facility, the data become useful information—information that can be used to solve problems, enhance decision making, keep track of work being done, and even predict future performance and problems.

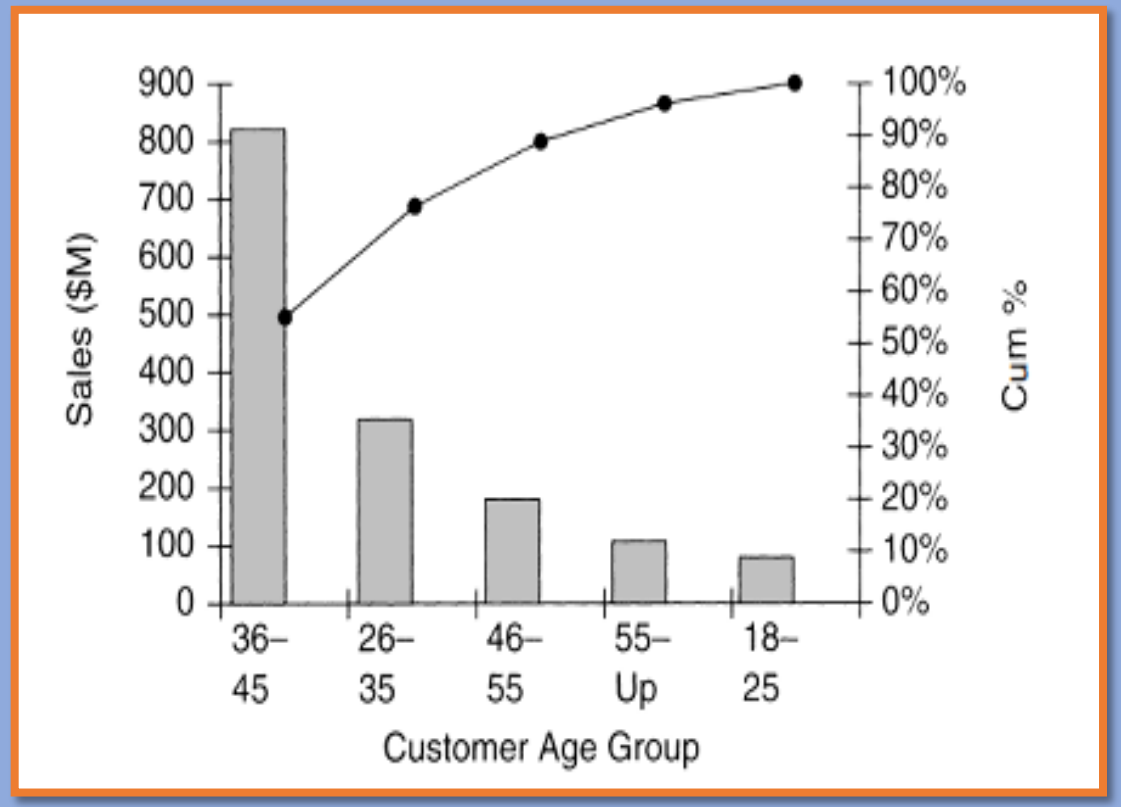
1. Pareto Charts

- The *Pareto chart is a very useful* tool wherever one needs to separate the important from the trivial. Pareto had the insight to recognize that in the real world a minority of causes lead to the majority of problems. This is known as the Pareto Principle. Pick a category, and the Pareto Principle will usually hold.

- For example, in a factory you will find that of all the kinds of problems you can name, only about 20% of them will produce 80% of the product defects: Eighty percent of the cost associated with the defects will be assignable to only about 20% of the total number of defect types occurring.

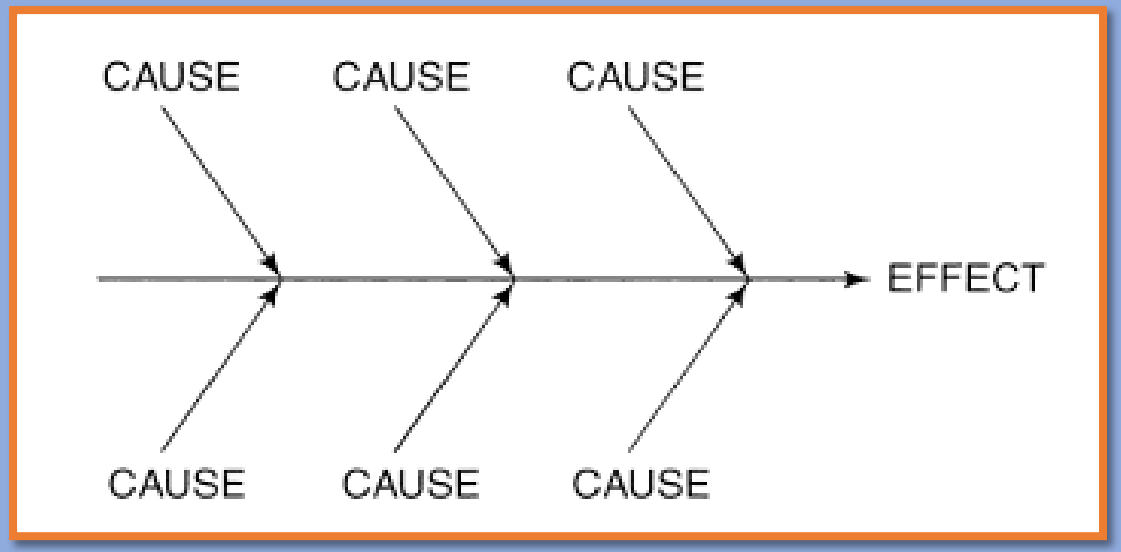
1. Pareto Charts

- The Pareto chart in Figure 2 shows bars representing the sales of a particular model of automobile by age group of the buyers. The curve represents the cumulative percentage of sales and is keyed to the *y*-axis scale on the right.
- The manufacturer has limited resources in its advertising budget, and the chart reveals which age groups are the most logical choice to target.
- Concentrating on the 26 to 45 age bracket will result in the best return on investment because 76% of the Swift V-12 buyers come from the combination of the 36 to 45 and 26 to 35 age groups.

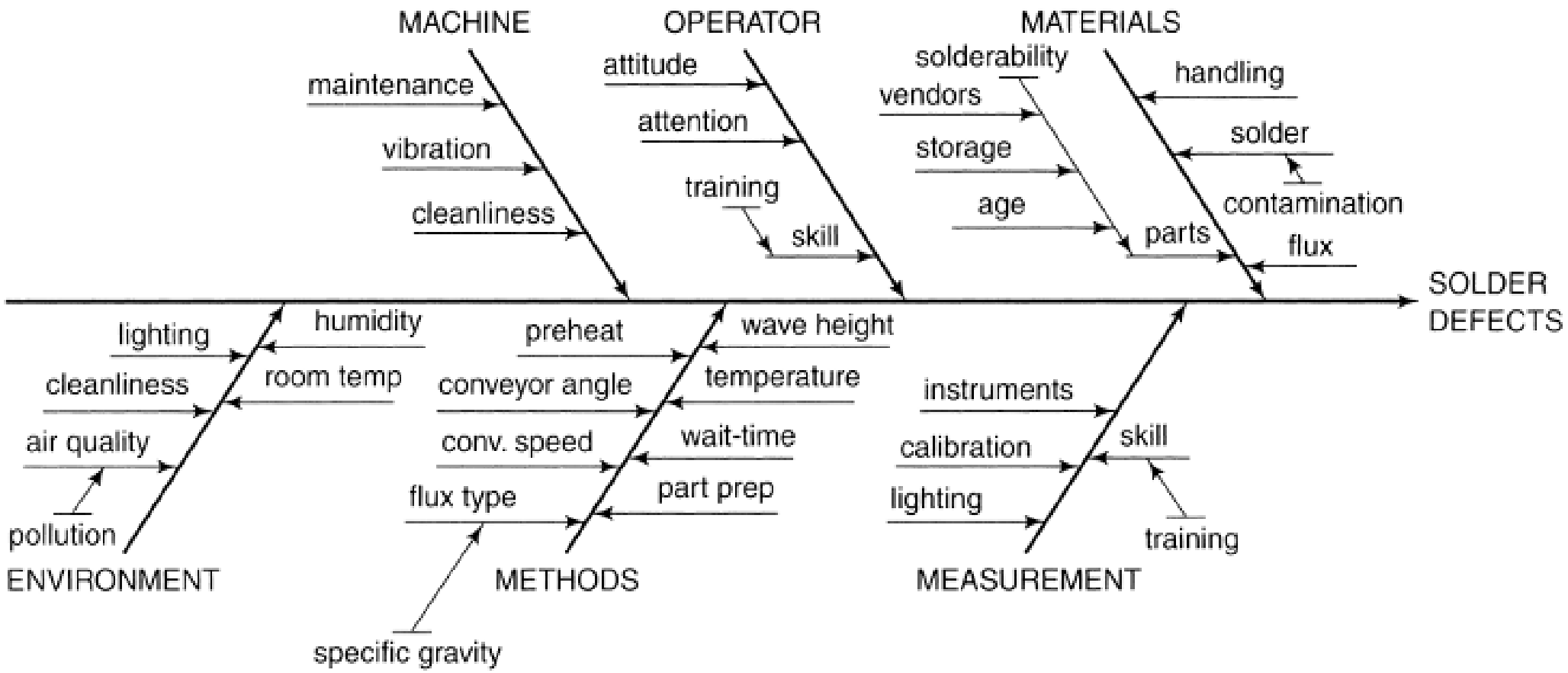


2. Cause-and-Effect Diagrams

- A team typically uses a cause-and-effect diagram to identify and isolate causes of a problem. It is also often called a fishbone diagram because that is what it looks like. The benefits of using cause-and-effect diagrams as follows:
  1. Creating the diagram itself is an enlightening, instructive process.
  2. Such diagrams focus a group, thereby reducing irrelevant discussion.
  3. Such diagrams separate causes from symptoms and force the issue of data collection.
  4. Such diagrams can be used with any problem.



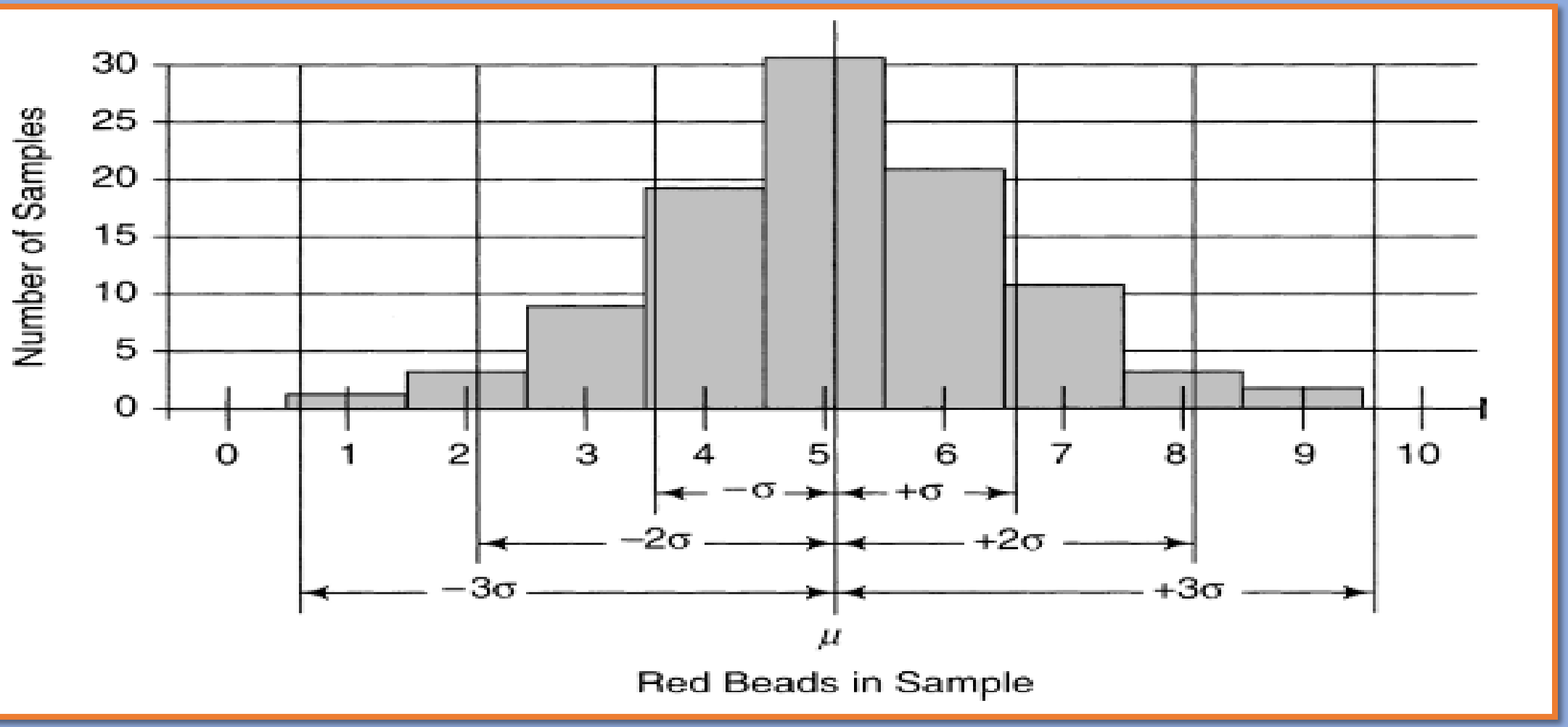
2. Cause-and-Effect Diagrams



3. Histograms

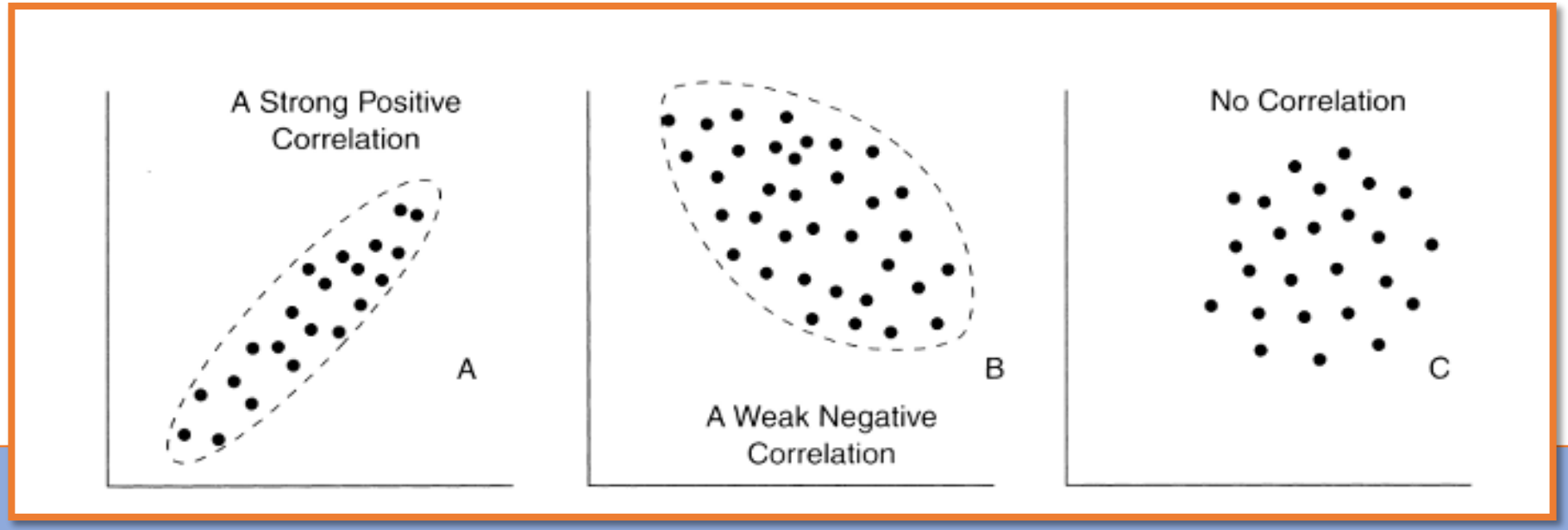
- Histograms are used to chart frequency of occurrence. How often does something happen? Any discussion of histograms must begin with an understanding of the two kinds of data commonly associated with processes: *attributes* and *variables* data.
- An ***attribute data*** is something that the output product of the process either has or does not have. ***Variables data*** *are something that* results from measurement.
- **Potential Trap with Histograms** when measurements are taken over a long period of time. Too many things can affect processes over time: wear, maintenance, adjustment, material differences, operator influence, and environmental influence. The histogram makes no allowance for any of these factors.

3. Histograms



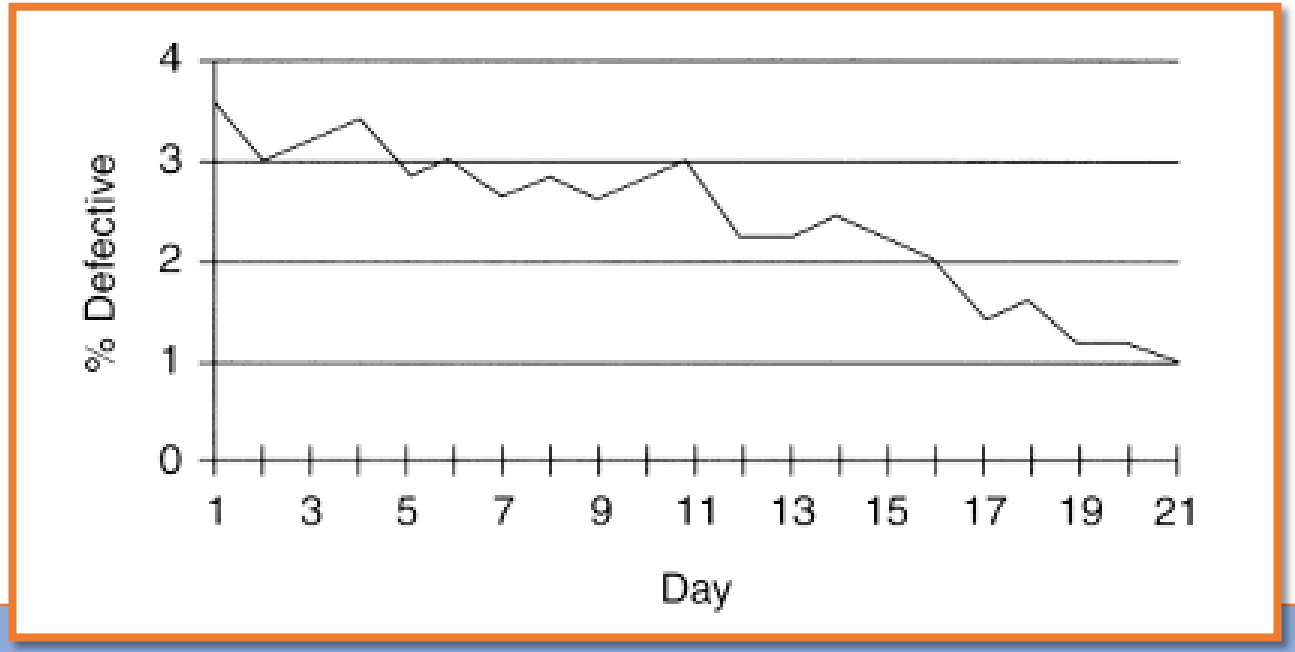
4. Scatter Diagrams

- The scatter diagram is used to determine the correlation (relationship) between two characteristics (variables). Suppose you have an idea that there is a relationship between automobile fuel consumption and the rate of speed at which people drive.



5. Run Charts

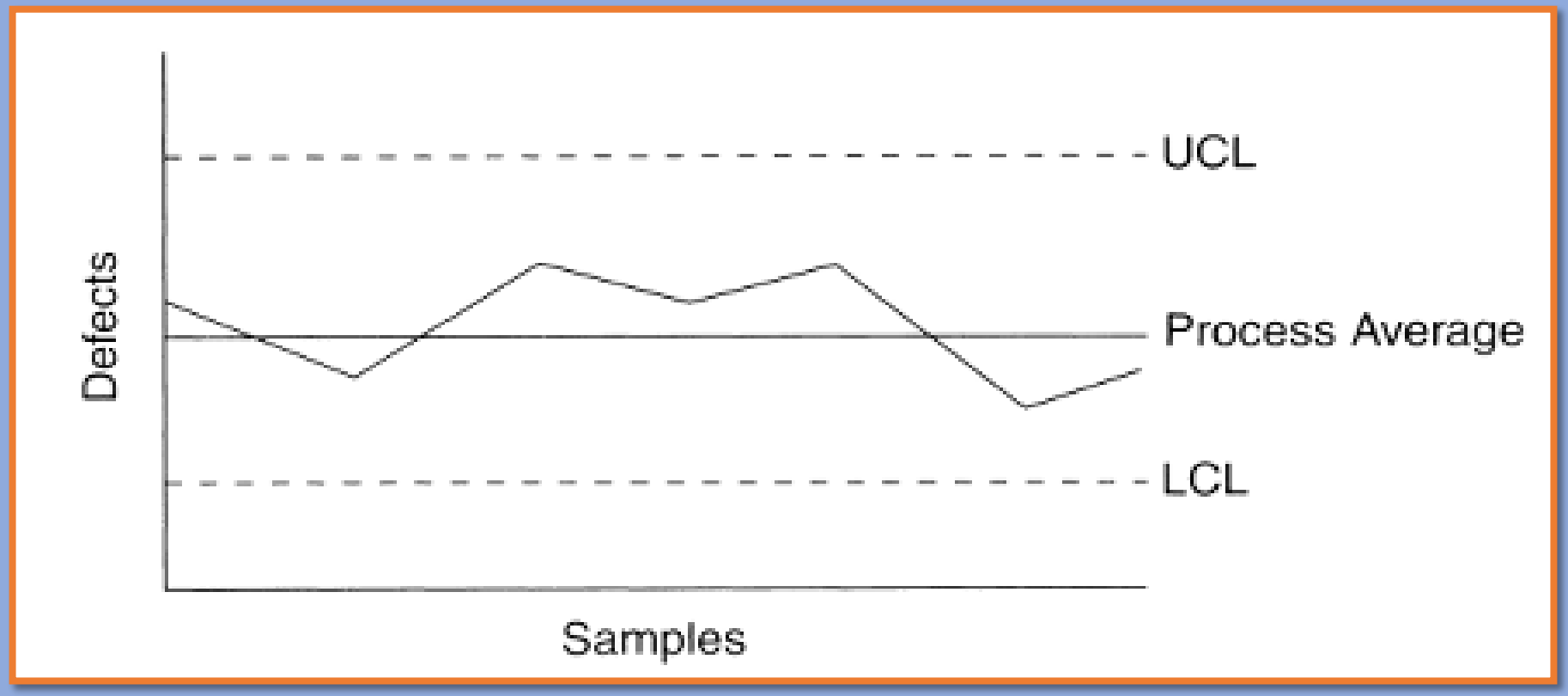
- The *run chart records the output results of a process over* time. The concept is strikingly simple, and, indeed, it has been used throughout modern times to track performance of everything.



6. Control Charts

- The problem with the run chart and, in fact, many of the other tools is that it does not help us understand whether the variation is the result of *special causes —things such as* changes in the materials used, machine problems, lack of employee training—or *common causes that are purely ran*dom.
- Data are plotted over time, just as with a run chart; the difference is that the data stay between the upper control limit (UCL) and the lower control limit (LCL) while varying about the centerline or average *only so long as the variation is the result of common causes (i.e., statistical variation)*

6. **Control** Charts



Additional tools

- Flowcharts A *flowchart is a graphic representation* of a process. A necessary step in improving a process is to flowchart it.
- In this way, all parties involved can begin with the same understanding of the process.