

Cause and Effect Diagrams

What causes variation in the things we do? Why don't we arrive to work at the same time every day? Why isn't the monthly report error free each month? Why can't we produce the same product day in and day out? No matter what, some sort of variation will occur in our lives. However, there is a way in which we can process it. The cause and effect diagram helps to summarize the causes of variation in a process. This module also introduces the cause and effect diagram. Once we understand cause and effect, we will be able to better comprehend variation and the part it plays in our day to day lives.

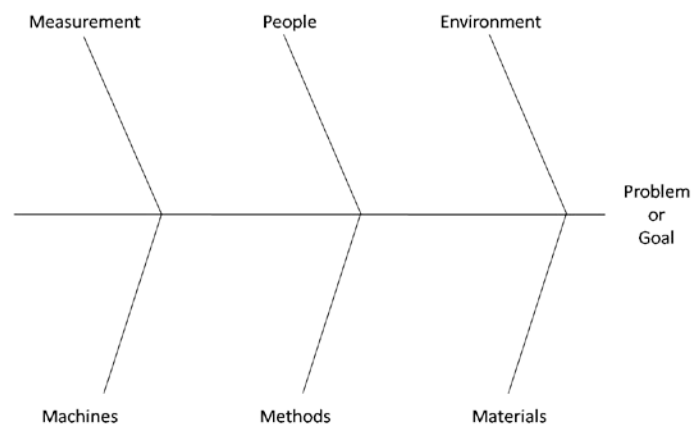
Purpose

The purpose of this module is to introduce the cause and effect diagram – what it is, when to use it, how to construct, and how to analyze a cause and effect diagram. Creating a cause and effect diagram is enjoyable and educational. These diagrams are usually constructed as a team or group activity, in order to get ideas from as many people as possible. As a result of everyone contributing to the diagram, each person tends to gain some new knowledge. Cause and effect diagrams introduce new ideas about the cause of problems by helping the group think about different categories of causes. The cause and effect diagram also helps to show how much we know about our process. If the diagram is full, we know a lot. If it is sketchy, chances are we don't have a good understanding of our process. Cause and effect diagrams should not be idle documents. That is, we should continually search for the cause of problems, so that we may add to the diagram as time goes on.

Understanding the Cause and Effect Diagram

A cause and effect diagram is a tool that shows the relationship between a quality characteristic (effect) and possible sources of variation (causes). As shown below, the effect could be a problem that needs to be solved or the goal of the process. The effect would then be listed on the cause and effect diagram. The causes involve everything that might trigger the problem. Cause and effect diagrams are also called fishbone diagrams (because of their shape) and Ishikawa diagrams (because of their developer).

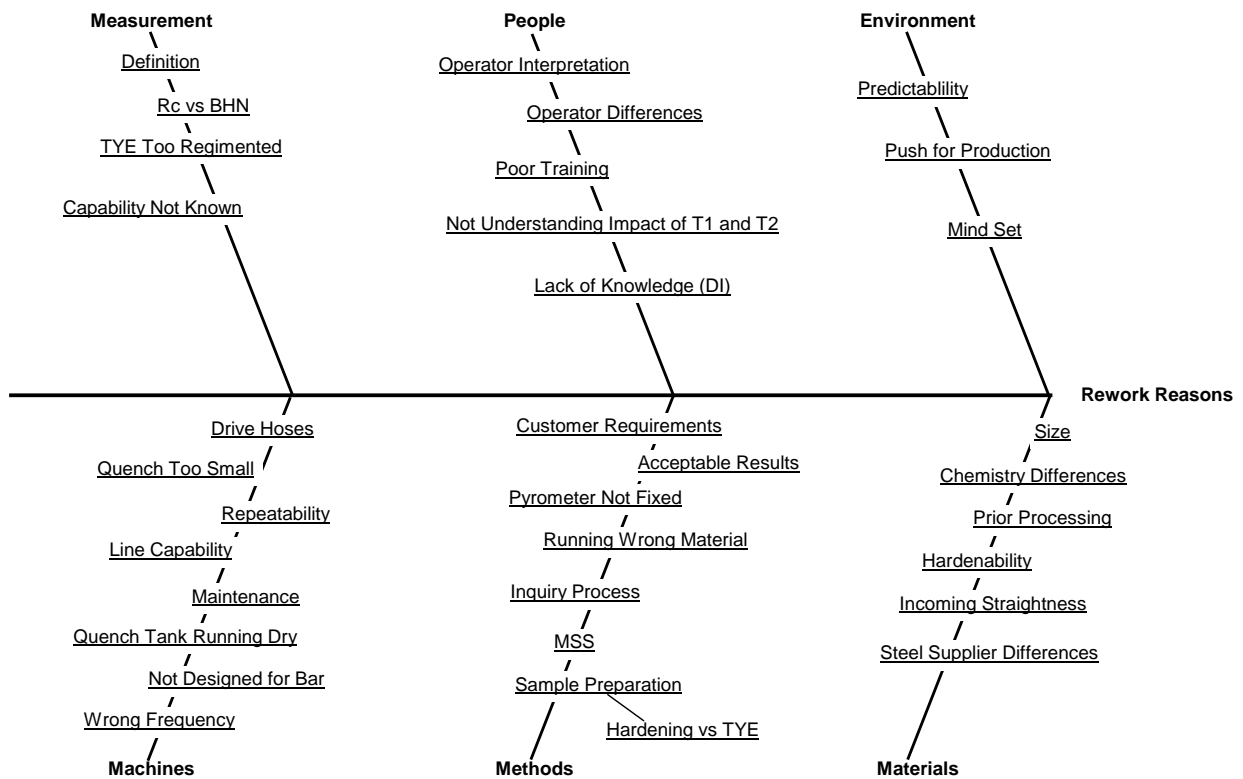
Figure 1: Cause and Effect Diagram



The cause and effect diagram is one of many root cause analysis tools. Root cause analysis should be thorough enough to “root” out the deep and hidden causes that are often missed with quick fixes to problems. So, the more elaborate the diagram, the better the chance of rooting out the problem in the process.

Figure 2 is an example of a cause and effect diagram for reasons for rework in a heat treating facility. The "causes" of variation in this characteristic are categorized into six main factors: measurement, people, environment, machines, methods and materials. These six factors are often referred to as the “4Ms, a P and an E.” Each of these main factors is divided into detailed causes. For example, a detailed cause under the "Machines" main factor is quench too small.

Figure 2: Cause and Effect Diagram for Rework



The six main factors in Figure 2 are often used for cause and effect diagrams. However, you may pick any factors you want to be the main factors.



Cause and Effect Diagrams

If someone can make a contribution to the company, he feels important.

-Dr. W. Edwards Deming

Introduction

- What causes variation?

Getting to work on time?

Error free reports?

Same product each day?