



PLTW Engineering

12/Writing a Problem Statement

April 8, 2020



12/EDD

Lesson: **4/8/2020**

**Objective/Learning Target: Students will be able to write a
Problem Statement**



Problem Statement

Not every problem has fast and simple solution. The best way to solve a technical problem is to first fully understand what the problem is.

Our natural instinct to dive in and try to solve the problem as quickly as possible. The problem in doing this is most times, you will not achieve the best technical solution.



Problem Statement

Probably the most critical step in the Engineering Design and Development process is defining the problem and writing the problem statement.

A well written problem statement states exactly what the problem is. It can be as short as one sentence, or it can be a series of shorter sentences.

The problem statement should have **NO MENTION OF A SOLUTION.**



Problem Statement Procedure

In your engineers notebook...

Conduct preliminary research; brainstorm, and list the five most important facts that support and justify the investigation of your problem or need.

Create a fact ranking sheet. Rank the facts according to importance or relevance in relation to the problem.

Problem Statement Procedure

Use the Problem Analysis Matrix to identify all aspects of the problem.

	Is	Is Not	Distinction	Probable Causes
Identify the scope of the problem	What exactly is the problem?	What is NOT the problem?	What is the distinction between what the problem is and isn't?	List the possible causes of the problem.
Identify where the problem is found	Where is the problem found	Where is the problem NOT found	What is the distinction between where the problem is and isn't?	How could location be a factor in the problem?
Identify when the problem occurs	When does the problem occur?	When does the problem NOT occur?	Is there a distinction in the timing of the problem?	How could timing be a factor in the problem?
	When did the problem first occur?	When did the problem last occur?		
Identify what extent the problem exists	How far does the problem extend?	Is the problem localized?	Describe the differences between what is and isn't affected by the problem.	How is the magnitude of the problem related to the possible causes?
	Does it occur in multiple units	How many units are NOT affected?		
	How much of a unit is affected?	How much of a unit is NOT affected?		



Problem Statement Procedure

In your engineers notebook...

Synthesize those facts into 1 or 2 sentences that best convey what your problem is.

On the next slide, you will have a rubric that can help you determine if your problem statement meets the criteria of a well written problem statement. If not, revise your problem statement and re-write until you get it.



Problem Statement Procedure

Topics	Excellent	OK	Poor	No Way
Bona fide problem is stated	Statement succinctly describes a technical problem.	Statement describes a technical problem, but not succinctly.	Statement does not contain a technical problem.	Statement is not made, or contains no problem.
Unrelated material	Statement contains the problem only. There is no unnecessary or unrelated material.	N/A	N/A	Statement contains information superfluous to describing the problem.
Limits on design	Problem statement is worded to allow an unlimited number of possible solutions.	Problem statement is worded to allow a few possible solutions.	Problem statement is worded to allow only a couple of possible solutions.	Statement is worded to severely limit solution choices, or is worded in a leading way to favor only one solution.



Problem Statement Procedure

Now that your problem statement is meeting all of the criteria in the “excellent” category. You can follow the Statement/Restatement guide to make sure the wording is easily understood by anyone even those outside of the class.



Statement Restatement Guide

With the most current draft of your problem statement in front of you, follow the steps below:

1. Try to restate the problem by replacing any technical words with their definitions.
2. Try to restate the problem by replacing key words with opposites, changing negatives to positives, etc.
3. Try to restate the problem by inserting definitives such as “always” or “never”



Statement Restatement Guide

Now that you have revised your problem statement a final time, chat with classmate about the last two steps of the Statement/Restatement process:

4. Defend your problem statement while your classmate argues against it.
5. Express your problem in the form of an equation or picture.



Finalize your problem statement

At this point in the process you should have fully explored your problem statement and derived a draft that meets the expectations for an Engineering Design and Development problem.

Make your final draft of the problem statement and be proud of the work you have done so far. The problem statement is your foundation for the rest of the project.



Helpful Links

[Effective Problem Statement Examples](#)

[Ashford University Problem Statement Guide](#)