

Asking the Right Questions

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In materials engineering, investigations often start with a question.

- Why did this part break?
- What caused this fracture?
- Did this part's failure contribute to the accident?
- Which part broke first?
- Is this failure analysis report correct?

The first question our clients ask may be relatively specific and, at times, short-sighted. Investigations often require a focused approach—but that doesn't mean we shouldn't use our prior knowledge and experience to help our clients or colleagues 'ask the right questions'.

In a recent investigation, several parties set out to determine the prevalence of a particular mode of corrosion in a number of components identified in a part failure. The initial analysis involved statistical trending of the corrosion occurrences.

I was asked to perform a similar analysis, but it soon became clear that key criterion for failure had not yet been defined. Was failure determined by the presence of corrosion? How much corrosion was too much? Was durability of the part a factor? It was later revealed that the initial request was posed by someone with little training in engineering or science.

The engineers that performed the first analysis had focused on answering the client's question—but had not taken the time to understand the client's objectives. Most experienced failure analysts are trained in problem solving and basic investigative skills. But because these engineers failed to communicate candidly during the investigation, they set in motion a chain of events that led to research, tests, and analyses in search of the wrong data. Not only did this result in unnecessary expense for the client, but the data did not help solve the problem.

This situation is a common one in our industry. Someone asks the wrong question. Unfortunately, it appears that "failure analysis" is often synonymous with the execution of standard laboratory tests and activities—doing only what is asked, without trying to understand how the answer will provide value. Don't misunderstand. Sometimes a standard laboratory test is all that is required. But there are two important questions we should repeatedly ask ourselves when working on a new project:

1. What is the problem statement?
2. Is it the right one?

Our responsibility does not stop with test execution and data delivery. We must apply our knowledge and use critical thinking to deliver answers that will help our clients achieve their objectives.

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