

NO TROUBLE IN PARADISE

A GUIDE TO TROUBLESHOOTING PROCESS FACILITIES



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<https://www.azernews.az/region/141800.html#:~:text=In%202019%2C%20two%20sunflower%20oil,oil%20will%20be%20produced%20annually.>

Troubleshooting is a vital skill for any engineer and plant operator to have. The ability to quickly and accurately diagnose and solve an equipment or system issue on site is invaluable in ensuring that plant operations can continue insofar as possible without disruption. This has far reaching effects, not just on process productivity, but also on company finances and plant operations. A holistic view of the problem and the effects of its solution must be maintained by all parties involved.

This article serves as a general step-by-step guide to troubleshooting process equipment in the most efficient and effective way possible.

1

Define the Problem

Defining the problem is the first step in troubleshooting. This may be challenging as processes are made up of interconnecting systems with various mass and energy balances. The most common way of identifying a problem on site is in the form of an alarm, which signals that something is amiss. However, the alarm is just a symptom of an underlying issue and the root cause of the actual issue (What? When? Where?) must be identified so that the correct actions can be taken further on in the process.

Once the root cause of the problem has been identified, it is important to familiarise oneself with the design intent (remember the holistic view that one has to take when troubleshooting). This will help in understanding what conditions and target production the facility was designed for and will make it easier to understand if the plant is operating at its intended design specifications. This step goes hand-in-hand with step 1 and can assist in identifying where the underlying issues in the plant may lie.

2

Understand Design Intent

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Site Visit

Conducting a site visit is extremely important to get an understanding of the practical aspects on site. Additional information can be obtained from operators and maintenance personnel regarding any changes made to the process, equipment modifications, etc. An important point to remember is to make use of your senses! Look, listen, and smell for anything that is indicative of something being awry at the facility (for example: smelling a certain chemical or hearing a pump cavitate). Ask questions, take notes, and make sketches where necessary.

Once a thorough theoretical and practical understanding has been established regarding the problem and the facility, the information gained can be analysed. At this stage, it must be determined if there is enough information and data to propose a plausible solution to the problem. If not, the required additional information must be obtained through the correct channels in order to move forward with the troubleshooting process.

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Analyse Information

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Establish Cause

Once sufficient information and data has been received, work can start on identifying the root cause of the problem. Logical analysis in defining the root cause is to look at the bigger picture and then analyse smaller pieces of it until the piece with the problem can be found and the cause can be pinpointed. For example: If the big picture is that productivity is not being met, divide the facility into smaller sections (raw materials, reactor, storage, etc.). Establish which of these sections are not running as desired (remember design intent) and look more closely into these sections. Continue this process until a specific

The next step in the process is to propose a solution (or multiple solutions) to the identified cause of the problem. If multiple solutions are proposed, one can rank them in order of likelihood to be successful to determine which solution would be the best to test first. Always involve the plant operators throughout the duration of the testing and keep them informed of the methods and reasoning for the solution. After all, they will be the ones to take over on the operations and running of the plant and this knowledge will be beneficial to

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Propose & Test Solution/s

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Implement or Repeat

If the proposed solution testing is successful, steps can be taken to fully implement the solution into the system or process and step 8 can be executed. However, the solutions testing may be repeated if the initial test was unsuccessful or if there are multiple other solutions that have characteristics are more attractive to the Client. For example, some solutions may be more cost effective, safer, have ease of application or fewer resource demands. Ultimately, the optimum solution must be found that meets the objective while also having some added benefits.

Once the proposed solution has been tested, is successful and agreed upon by the Client, it is important to document the functionality of the solution over a period of time. That is, monitor the specific piece of equipment or process that has been modified by the solution to determine if it causes any additional new problems upstream or downstream. If no new problems are introduced into the system, the troubleshooting exercise was successful, and the problem has been solved!

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Document Functionality