

**Source:** Juran's Quality Handbook: The Complete Guide to Performance Excellence, 7th Edition

**ISBN:** 9781259643613

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## 16.8. Phase 4: Control to Hold the Gains

This phase is the most important one in the RCCA process for ensuring that the problem does not recur or, if it does, that the recurrence is recognized and remedied quickly. If a recurrence is recognized, it should be an indication to the project team that their job is not finished—they've missed a root cause during the course of their problem solving or designed and implemented an ineffective remedy.

If the problem solving has been done methodically, as described here, and a broad range of possible causes and remedies were considered during the formulate theories and evaluate alternatives steps, the remedy should be robust and the cause and problem should not recur. The controls put in place to hold the gains will indicate whether this is so.

### 16.8.1. Redesign Controls

The primary activity in designing controls is the development of a control plan. Hopefully, an effective control plan for the process in question is already in place and will only require modification to add control subjects related to the problem's solution.

The first step in building an effective control plan is selecting appropriate control subjects. Control subjects are those features of the product or process that will be measured to determine whether the process is remaining in control. Each control subject's performance is monitored using the feedback loop described in [Fig. 16.3](#). A control plan matrix is used to keep track of the function of the feedback loop and to plan for action if the process or product does not meet standards. An important purpose of the process control matrix is to alert the process operator when the process is out of control and what to do to get it back under control.

In this matrix ([Fig. 16.5](#)), the horizontal rows describe the control elements for each subject. The vertical column headings indicate each element of the control activity:

- *Control subject.* Those features of the product or process that will be measured to determine whether the process is remaining in control.
- *Subject goal or standard.* The acceptable limits of performance for the product or process. Often, these are control limits on an SPC chart and are the primary basis for determining if the process is stable or out of control.
- *Unit of measure.* How will the measurement be stated? Inches? Millimeters? Percent defective?
- *Sensor.* What device, person, or combination of the two will be used to obtain the measurement?
- *Frequency of measurement.* How often will the control subject be measured (e.g., hourly, daily, weekly, etc.)?
- *Sample size.* How many measurements will be taken at the stated frequency?
- *Where are measurements recorded* (logbook, chart, database, etc.)?

- *Measured by whom.* Who is responsible for applying the sensor to the control subject and obtaining and recording the measurements?
- *Criteria for taking action* This generally includes whatever process performance is outside the subject goal or standard. This variation is usually due to special causes and would prompt the troubleshooting part of the feedback loop.
- *What actions to take.* Knowing the cause of the out-of-control condition helps the assigned person take the appropriate action to bring the process back into conformance with the subject goal.
- *Who decides.* Who will make the call on the action to be taken?
- *Who acts.* Specific action(s) to be taken by the actor on the control subject to bring the process back into conformance with the subject goal.
- *Where action recorded.* Identifies where the actions taken to resolve the issue will be recorded. This recording is useful for analysis of similar problems in the future.

**Figure 16.5** Control plan matrix.

Process control plan for:				Date:			Revision level:		Approved by:			
Control subject	Subject goal (standard)	Unit of measure	Sensor	Frequency of measurement	Sample size	Where measurement recorded	Measured by whom	Criteria for taking action	What actions to take	Who decides	Who acts	Where action recorded

## 16.8.2. Implement Controls

Once a suitable control plan has been designed, implementation is a matter of training process owners and operators in its use. If SPC is a part of the plan, specific training on the proper use, interpretation of, and appropriate response to control charts must be included. The process owners also become the owners of the control plan, so their involvement in its implementation is essential.

## 16.8.3. Audit Controls

For a short time after the controls are in place, the project team, in conjunction with the process owners and operators, should monitor their effectiveness. This will provide the opportunity to recognize any ineffective elements of the plan and modify accordingly.

By following the above four-phase approach to RCCA, project teams should consistently identify the root cause(s) and apply appropriate remedies in a relatively short time. During the time that it takes to identify and alleviate the causes, an interim action may be needed to ensure that defective products, services, or information do not reach the customer. These actions are sometimes referred to as containment. They should be designed to be effective and temporary until the root cause of the problem can be determined and alleviated.