

# 1) Statistical Process Control Charts - R Chart

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## What is a Statistical Process Control Chart?

In any manufacturing process, the quality of the product is maintained by using a technique known as the **Statistical Process Control**. The method involves collecting data of the raw material used, the manufacturing processes involved, and the final product. Data is mainly extracted from the machines and instruments involved in the manufacturing processes. This collected data, based on its type, is recorded and tracked on various types of control charts. These charts are of different kinds and are collectively known as **Statistical Process Control Charts**. Later, these charts are used to evaluate, monitor and control a process.

## What is an R chart?

The **R chart** is a type of control chart which is used to measure the variation of a process based on the samples taken from the process at regular intervals (hourly, daily, weekly, monthly, etc.). In the **R chart**, for a continuous process variable, sample ranges are plotted to control variability.

## Introduction

The purpose of this experiment is to evaluate a manufacturing process dataset in R, by creating its **R chart**.

## Procedure

Step by step procedure to conduct the required experiment -

1. Selecting dataset for the creation of **R chart**
2. Creation of **R chart**

*Note : Please make sure that the following package is already installed -*

- qcc

## Code and Results

### Data used for analysis

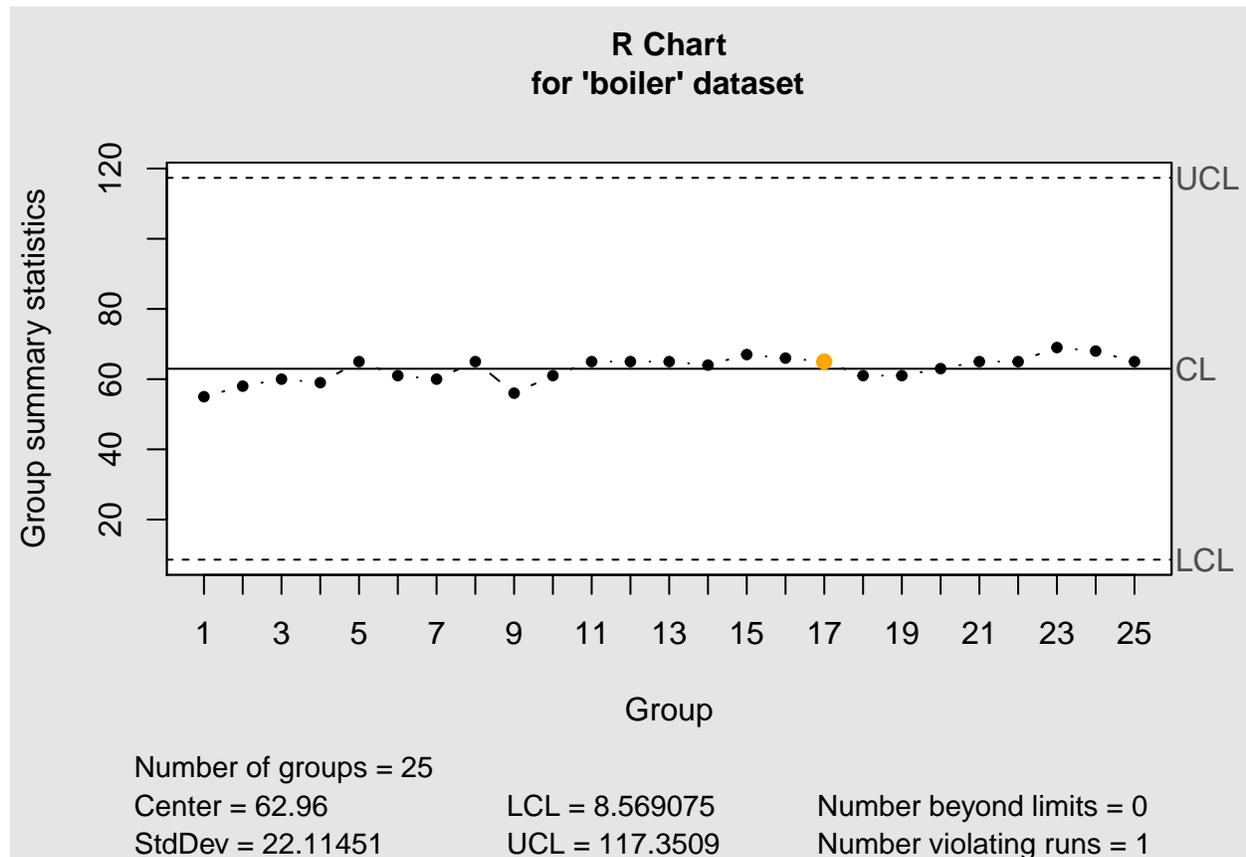
```
## R has a predefined dataset with the name "boiler" in the package "qcc"  
# To know more about the dataset, after loading "qcc" package type "?boiler" in the  
# console
```

## Selecting dataset for the creation of R chart

```
# 1) Selecting appropriate dataset to use for analysis  
# Run the following command after removing "#" if "qcc" package is not installed  
# install.packages("qcc")  
library(qcc)  
data(boiler)
```

## Creation of R chart

```
# 2) Plotting R chart  
chart <- qcc(data = boiler, type = "R", data.name = paste0(as.character(""),  
"boiler",as.character("")," dataset"))  
plot(chart, chart.all=FALSE)
```



## Conclusion

In the above plot, we can observe that one data point is violating runs. Hence, the process is not under control.