

Chapter 886

Screening Designs

Introduction

Screening designs are used to find the important factors from a large number (up to 31) of two-level factors. When the number of runs is 4, 8, 16, or 32 (powers of 2), the design is a regular fractional replication. When the number of runs is 12, 20, 24, or 28, the design used is a Plackett-Burman design.

This program uses the screening designs given in Lawson (1987). These designs make it possible to evaluate each main effect, although these are aliased with several interactions.

An introduction to experimental design is presented in Chapter 881 on Two-Level Factorial Designs and will not be repeated here.

Procedure Options

This section describes the options available in this procedure.

Design Tab

This panel specifies the parameters that will be used to create the design values.

Experimental Setup

Runs

The desired size (number of rows) of the experiment. This number must be 4, 8, 12, 16, 20, 24, 28, or 32. This number determines which design is generated.

- **Random**

The rows are randomly ordered (random blocks and random rows within blocks). Use this option when the order of application to experimental units is governed by the row number.

- **Standard**

The rows are not randomly ordered. Instead, they are placed in standard order. Use this option when you want to quickly see the structure of the design.

Sort Order

The order of the generated rows. The rows may be in random or standard order.

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Experimental Setup – Factor Values

Factor Values

Each factor has two possible values (levels), which are specified here. These are the values that will be written to the database. The first value is used to represent the low value. The second value represents the high value. You may use both text and numeric values, although we recommend that you stick with numeric values since these may be used in the regression program.

Enter a pair of values separated by a blank or comma, such as ‘-1 1’ or ‘0 1.’

Data Storage to Spreadsheet

Store Data on Spreadsheet

Check this box to generate the design data on the spreadsheet. The spreadsheet data will be identical to the design data generated on the output window.

First Factor Column

This is where the group of columns that is to contain your design begins. The K-1 columns after this column are also filled with data. The number of variables used is determined by the number of Factor Values boxes that contain data.

Warning: The program fills these columns with data, so any previous data will be lost.

Example 1 – Screening Design

This section presents an example of how to generate an experimental design using this program. **CAUTION: since the purpose of this routine is to generate data, you should always begin with an empty output spreadsheet.**

In this example, we will show you how to generate a six-factor design using 16 runs.

Setup

This section presents the values of each of the parameters needed to run this example. First, from the PASS Home window, load the **Screening Designs** procedure window by expanding **Design of Experiments**, then clicking on **Experimental Design**, and then clicking on **Screening Designs**. You may then make the appropriate entries as listed below, or open **Example 1** by going to the **File** menu and choosing **Open Example Template**.

1 Specify the design parameters.

- On the Screening Designs window, select the **Design tab**.
- Set the number of **Runs** to **16**.
- Select **Standard** in the **Sort Order** list box.
- Set six of the **Factor Values** boxes equal to **-1 1**.
- Check the **Store Data on Spreadsheet** box.
- Enter **1** in the **First Factor Column** box.

2 Run the procedure.

- From the Run menu, select **Start Calculation**. Alternatively, just click the Calculate button.

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Six-Factor Screening Design in Sixteen Runs

Experimental Design

Row	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
1	-1	-1	-1	-1	-1	-1
2	1	-1	-1	-1	1	1
3	-1	1	-1	-1	1	1
4	1	1	-1	-1	-1	-1
5	-1	-1	1	-1	1	-1
6	1	-1	1	-1	-1	1
7	-1	1	1	-1	-1	1
8	1	1	1	-1	1	-1
9	-1	-1	-1	1	-1	1
10	1	-1	-1	1	1	-1
11	-1	1	-1	1	1	-1
12	1	1	-1	1	-1	1
13	-1	-1	1	1	1	1
14	1	-1	1	1	-1	-1
15	-1	1	1	1	-1	-1
16	1	1	1	1	1	1

The values were also produced on the spreadsheet.

These values are also generated on the spreadsheet. Usually, you would specify the number of runs as close to the number of variables as possible, while still leaving some degrees of freedom for an estimate of error.