

DOE Fractional Factorial Design

This guide provides instructions on designing a fractional factorial experiment using the Screening Design platform. Fractional factorial experiments are used when it's more efficient to not perform an experimental run for every possible treatment combination as is done in a full factorial design.

Create the Design (Screening Design)

- Open the platform under DOE > Classical > Two Level Screening > Screening Design.
- 2. Specify the Response(s):
 - Double-click on **Y**, under **Response Name**, to name the response.
 - If needed, change the response **Goal** and **Upper** and **Lower Limits**.
 - Click Add Response to add additional responses.
- 3. Specify the Factors:
 - Add the desired number of Continuous (2-level) and/or
 2- or 3-Level Categorical factors.
 - Add the factor names and levels.
- 4. Click **Continue**. From the **Design List**, select the desired design and click **Continue**.

Note: Choose an appropriate block size (i.e., runs within each block) if there is a blocking variable that needs to be accounted for in the experiment. Full factorial designs are also available to choose.

- Specify the Run Order (default is Randomize), the Number of Center Points and the Number of Replicates (the number of additional sets of runs for each design point). Here we created an unreplicated fully randomized 2⁵⁻² fractional factorial design with 3 center points, totaling 11 runs.
- 6. Select **Make Table** to generate the design table (or **Back** to make changes).

To create an 8 run 2⁵⁻² Resolution III fractional factorial design.

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Choose a design by clicking on its row in the list.								
Number	Block		Resolution					
Of Runs	Size	Design Type	- what is estimable					
8		Fractional Factorial	3 - Main Effects Only					
8	4	Fractional Factorial	3 - Main Effects Only					
12		Plackett-Burman	3 - Main Effects Only					
16		Fractional Factorial	5 - All 2-factor interactions					
16	8	Fractional Factorial	4 - Some 2-factor interactions					
16	4	Fractional Factorial	4 - Some 2-factor interactions					
16	2	Fractional Factorial	4 - Some 2-factor interactions					
32		Full Factorial	>6 - Full Resolution					
32	16	Full Factorial	5+ - All 2-factor interactions					
32	8	Full Factorial	5+ - All 2-factor interactions					
32	4	Full Factorial	4 - Some 2-factor interactions					
32	2	Full Factorial	4 - Some 2-factor interactions					

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5	00000	12.5	1.5	110	160	4.5	•
6	-+-+-	10	2	100	180	3	•
7	+++++	15	2	120	180	6	•
8	-++-+	10	2	120	140	6	•
9	+	10	1	100	140	6	•
10	+++	15	1	100	180	6	•
11	00000	12.5	1.5	110	160	4.5	•

The **Screening** and **Model** scripts will be saved to the data table and the design specification window stays open to change or regenerate the design.

Notes:

- Select Evaluate Design to view properties of the design.
- The **Easy DOE** platform (under DOE menu) provides a guided workflow to step through the process of creating and analyzing experiments and is an alternative to the steps above for creating a design.
- Screening designs can also be generated from the **Custom Design** platform.

Visit Design of Experiments Guide in JMP Help to learn more.