SOFTWARE SUITES FOR DESIGN OF EXPERIMENTS – COMPARATIVE OVERVIEW

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ABSTRACT
This paper provides a comparative overview of three software suites for computer-aided design of experiments. It provides a comparison of the supported general types and models of the design of experiments. In this paper we have provided the flowchart for sample design of experiment for each suite. Finally, we have given overall evaluation of the software suites and, as conclusion, we have provided certain recommendations which suite is appropriate for which type of users.
Keywords: design of experiment, DOE, software, software suite

1. INTRODUCTION

Modern design of experiments and analysis of the experiments' results must have been computer-aided. Complexity of the designs, complex statistical calculations, graphical analysis and presentation of the results, optimization, cutting down the expenses, shortening time to market – are only beginning of the list of the reasons.

The software industry responded to this urge, so there are a certain number of software suites for design of the experiments on the market.

Here is a list of suites available to the authors:

Table 1. Vendors and software suites

Vendor	Software Suite	Vendor's web site
Applied Materials (by acquisition of Brooks Software)	Cornerstone	www.brookssoftware.com
ASD/QMS	ANOVA-TM	www.spcanywhere.com
Digital Computations Inc.	DOE PRO XL 2007	www.sigmazone.com
Minitab Inc	Minitab	www.minitab.com
Nutek Inc.	Qualitek-4	www.nutek-us.com
SAS Institute Inc.	SAS/QC	www.sas.com
SAS Institute Inc.	JMP	www.jmp.com
Stat-Ease Inc.	Design-Expert	www.statease.com
Statsoft Inc.	Statistica	www.statsoft.com
Velocity Pointe	ECHIP	www.velocitypointe.com

2. COMPARATIVE OVERVIEW

Comparison of the software suites consists of the following:
- General types of the designs of the experiments supported
- Models of the designs of the experiments supported
- Flowchart for sample design of experiment

2.1. Software Suites to be Compared

In this paper we have compared three software suites, following in the alphabetical order:
- Design-Expert version 7.1.4,
- Minitab version 15 and
- Statistica version 8.0.

2.2. General types of the design of experiments supported

Table 2 provides general types of design of experiments provided in the software suites:

Table 2. General types of the design of experiments supported

General types of the design of experiments	Design-Expert	Minitab	Statistica
Factorial	☑	☑	☑
Response Surface	☑	☑	☑
Mixture	☑	☑	☑
Combined	☑	☑	☑
Taguchi	(*)	☑	☑

(*) Design-Expert considers Taguchi designs as factorial and lists them there.

2.3. Models of the Design of Experiments

Table 3 provides comparison of the models of the designs of experiments supported in particular suite.

Table 3. Models of the design of experiments supported

Model of the design of experiments	Design-Expert	Minitab	Statistica
2-level factorial	☑	☑	☑
Minimum Run Equireplicated Res V	☑		☑
Minimum Run Equireplicated Res IV	☑		☑
Resolution V Irregular Fraction	☑		
General Factorial	☑	☑	☑
D-optimal	☑	☑	☑
Plackett-Burman	☑	☑	☑
Taguchi	☑	☑	☑
Central Composite	☑	☑	☑
Box-Behnken	☑	☑	☑
One Factor	☑		
3-Level Factorial	☑		☑
Distance-based	☑	☑	
User-Defined	☑		
Historical Data	☑		
Simplex Lattice	☑	☑	☑
Simplex Centroid	☑	☑	☑
Screening	☑		☑
Extreme Vertices		☑	
Latin Square, Greco-Latin Square and Hyper Greco-Latin Square			☑

Note: Taguchi designs in Design-Expert are referred to as "Taguchi Orthogonal Arrays".

2.4. Flowchart for Sample Design of Experiment
In this chapter, we have shown a flowchart for typical usage for each suite.
The flowchart is given for a new design of experiment, Taguchi L16 (2^15), with 1 (one) response.

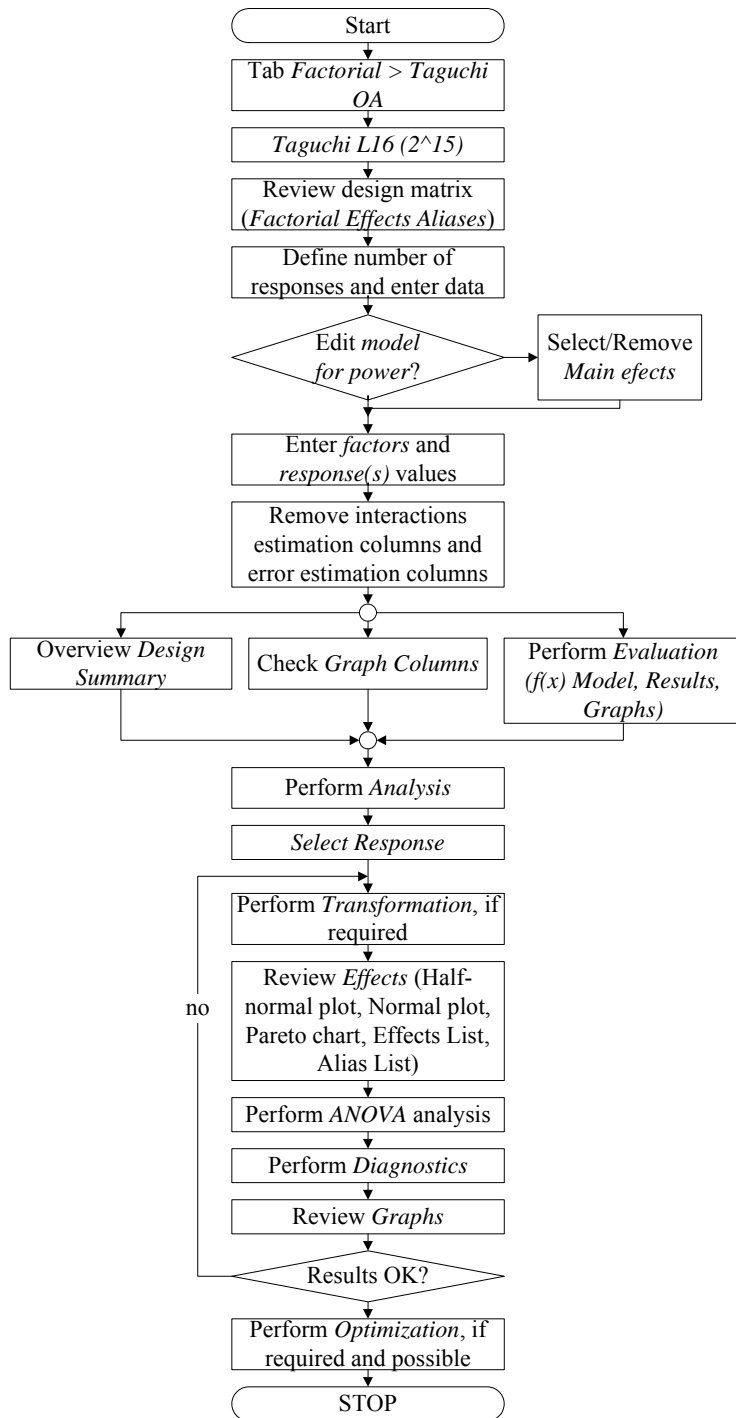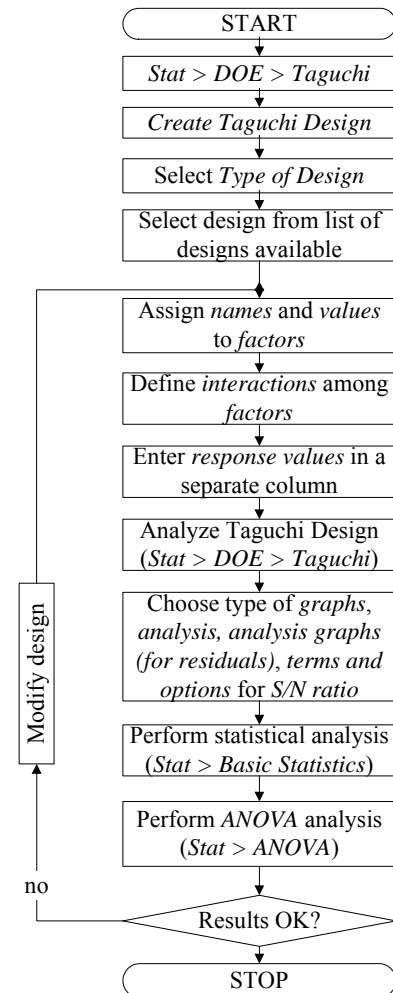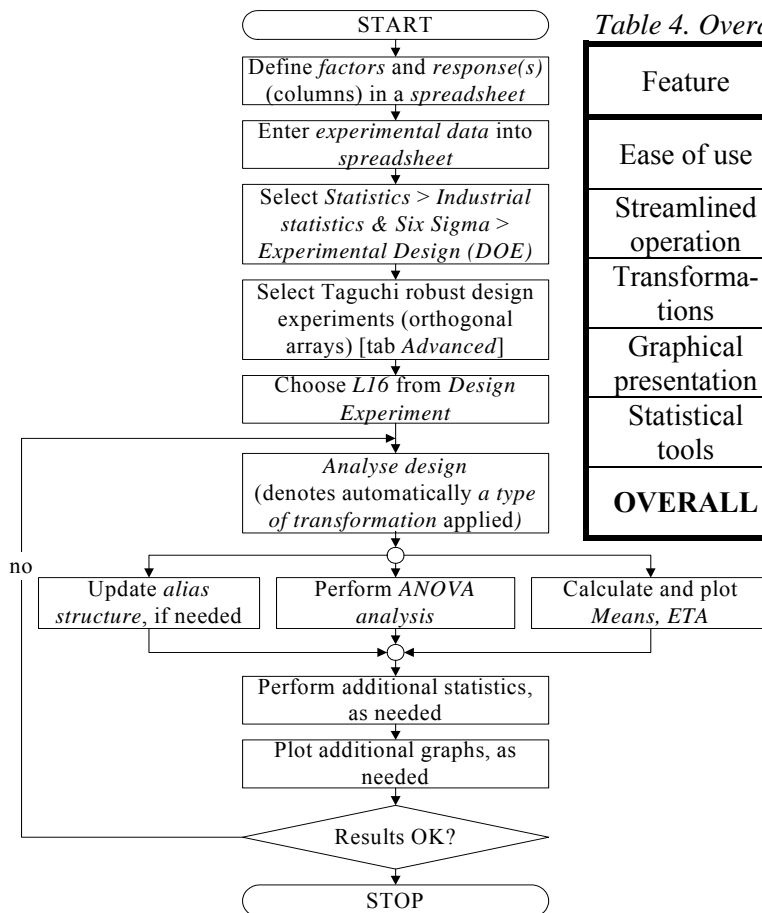*Figure 1. Flowchart – Design-Expert*

Figure 2. Flowchart – Minitab

Figure 3. Flowchart – Statistica

Table 4. Overall Evaluation

Feature	Design-Expert	Minitab	Statis tica
Ease of use	very good	very good	very good
Streamlined operation	very good	good	good
Transforma-tions	very good	good	good
Graphical presentation	very good	very good	good
Statistical tools	good	very good	very good
OVERALL	**very good**	**very good**	**very good**

3. CONCLUSION

Based on features presented in tables 2, 3 and 4 and sample flowcharts for each software suite, we have reached the following conclusion:

− If there is need for higher number of supported types of the designs of experiment and very streamlined, computer-lead procedure, enriched with handy and very interactive choice of graphs and reports, the Design-Expert may be your choice.

− If your everyday duties, beside design of experiments, require very rich set of the statistical tools and plenty of graphs, you may opt for Minitab.

− If you require a lot of statistical tools, "Six Sigma" tools and eventually data-mining tools, and know how to program and use scripts, your suite of choice may be Statistica.

4. REFERENCES

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