

H-JG Consulting

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Compound Simulation Tool "GrafCompounder" Version 2.004



Advantages to the Customer

Computer Aided Compound Development

- **Better utilization of historic compound data base**
- Faster results minimizes efforts and time in development
- Increases creativity through compound simulation

Compound calculation and simulation goes beyond "trial and error" and typical statistical design of experiment (DoE) algorithms



Specifics of GrafCompounder

- The GrafCompounder uses the Multiple Linear Iteration method [MLI] to calculate a new recipe according to properties targeted
- The GrafCompounder enables the user to analyze and improve their compound database via identification of faulty data sets
 - Each compound is taken into account for the calculation and the influence of each on the final result is visualized as a ratio
- The GrafCompounder is a fast and easy to use tool without utilizing a complex "hidden" mathematical and analytical method



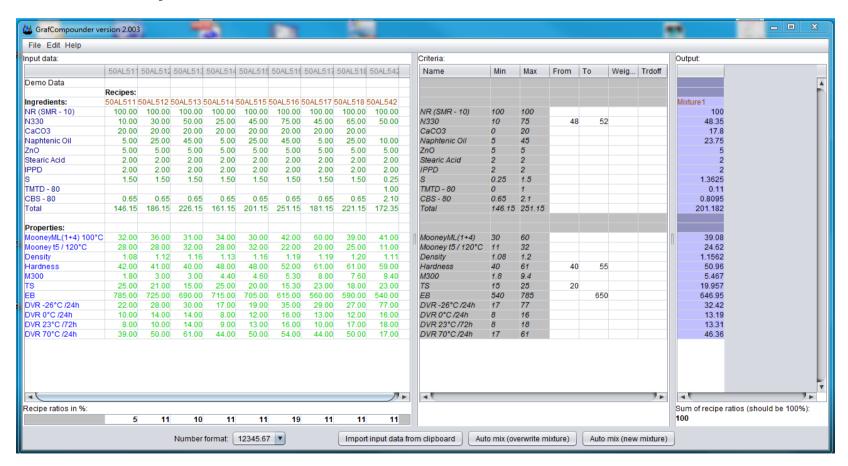
Specifics of GrafCompounder

- The resulting formulas calculated correspond to the general rules of compounding
- These formulas will show property scores larger than the 90% confidence interval
- Only one confirmation experiment is needed as opposed to multiple trials



Example of Program Working Screen

Screenshot of GrafCompounder with demo data, targets and a calculated compound





Projects done with GrafCompounder

Samples of Projects successfully developed with GrafCompounder before market release:

- Non-bronzing iridescence EPDM compound
- SBR/EPDM blend for automotive profile
- Sponge corner moulding EPDM compound
- EPDM Compound for body mounts
- Seal for drinking water application
- NBR/PVC blend in automotive air ducts
- Very low temperature resistance NBR/PVC grommets



Market Situation

There is no program on the market available with features like the GrafCompounder

- There are 9 US, 3 EP and 2 WO patents in the literature but nothing has been marketed
- Software CAD-Chem was taken from the market in approximately 2004

Similar programs

- Alfa-Technologies: Compound
 - A flexible recipe management system that provides a knowledge base that can be easily searched



Market Situation

References (Selection)

- PT Hung A, Korea
- Dunlop Belt, Thailand
- Weros Technolgy, Germany
- Weir Minerals, Australia + USA
- Kozato Kizai, Malaysia
- Medical rubber products, Malaysia
- Ryco Hydraulics, Malaysia
- Loadstar, Srilanka
- Zeon, Thailand + USA
- Mahidol University, Thailand
- Rubber Research Institute,Malaysia
- LS Cable, Korea

- Carlisle Transportation Products,
 Thailand + USA
- Emerald Resident Tyre, India
- Lanxess, India
- Nisco Aegis Polymers, India
- Vitillo, Italy
- Royal Tires, India
- Parker, USA
- Trelleborg, USA
- Hexpol, USA
- Trico Products, USA
- National Oilwell Varco, USA



Next steps

- Release of the "GrafCompounder" Version 2.004 will come at the end of 2014
- A comparison will be conducted between standard DoE software and GrafCompounder on correlations calculated between ingredients and physicals on a set of formulations