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Use of Functional Data Explorer in a mixture design for tribological performance prediction

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Functional data creates challenges: it generates a lot of measurements, sometimes with redundant information and/or high autocorrelation, sampling frequency may not be regular, and it can be difficult to analyse the information or pattern behind the data.

One very common practice is to summarize the information through some points of interest in the curves: maximum/minimum value, mean, or other points are commonly chosen.

The study's objective is to realize a mixture design for formulations containing up to 3 performance additives and analyse the results obtained from a tribological equipment (friction coefficient vs. temperature).

The first approach considered is to summarize the information through some values of interest: maximum friction coefficient, temperature at the maximum friction coefficient... This simple method enables us to find an optimal area for the formulation.

When using the Functional Data Explorer in JMP, tribological curves are modelled through a Splines mathematical model. The connection between the Mixture and the FDOE Profilers enables to explore the experimental space and predict the tribological response of any formulation.

This new approach enables a holistic view on the relevant systems behaviour, allowing for increased understanding of more complex interactions typically neglected by conventional evaluation.

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