Topic ID	**OEA88T**
Title	**What Makes Blending a Complex Process**
Category	**M-Manage Infrastructure**
eLearning Level	**Basic**

Introduction

Blending is a complex process. There is a basic equation involved in this process. As It is a nonlinear process, there are different sources of error in this process.

There are assumptions about blending equations. This process depends on the component's chemical characteristics and availability of stock.

This topic will discuss Factors behind the complexity of the blending process, blending as a nonlinear process and, steps to match the blending with reality.

The topic also discusses errors, basic blending equations, First Step Linearization, Use nonlinear Blend Models, Type-II Blend Non-linear Models, etc.

Mathematics of Blend Formulation

There is a basic blending equation:

$$Q_j^b = \sum_{j=1}^{m} \sum_{i=1}^{n} xiqi, j \pm G_j \mp V_j$$

There are many false assumptions concerning blend formulation. For example, Qualities of blend components remain constant during blending for a while, without any transformation, blend qualities may be utilized, blend component qualities remain unaffected by other/same component qualities,

Blend composition is not influenced by blend components qualities; a Basic equation may consist of component qualities of the blend, etc.

The first step solution is the linearization of the basic blending equation. After linearization, the blend components' qualities need transformation. Then they can be used as a linear multiplier.

$$Q_j^b = \sum_{j=1}^{m} \sum_{i=1}^{n} xif(q_j)$$

Here, "f" is the transformation function and depends on qj. In the second step, the nonlinear blend model can be used. In this model, blend components' qualities cannot be linearized. There are two types of nonlinear blend models. In the nonlinear blend model, there may be errors during the assessment of blend properties. In the case of online and offline blend optimizers, parameters biases are similar. Therefore, in the context of both models, there are errors in the final blend properties.

As per certain rules, there is the transformation of component rule. There is the nonlinear blending of empirical properties. For example, octane numbers. First, there is the measurement of components' properties. Then measured properties are mixed in proportion to their blend amount. Here, there may be a significant difference in comparison to measured blend properties.

Summary

It is not easy to model a blending process as it is a nonlinear process. In the blending process, sources of errors have to be eliminated. Historical blend data should be used for updating blend models. This has to be done in the context of biases and regressed parameters. For online/offline blend control optimization, linear/nonlinear blend models should be used. Because of the complexity of the blending process, blend models should be properly designed/developed,/maintained. Efforts should be made to avoid violations of spec and minimization of giveaways.

Options for eLearning this topic

Mode of eLearning	Available?
Free Course	No
Refresher Course	Yes
Pick N Choose (Custom Curriculum)	Yes
Advanced Level Course	Yes
Structured MCOR Curriculum	Yes