APPLICATION NOTE

Manufacture Multiple Grades of Chemicals with a Single Recipe

Industry: All   **Product Category: Systems**

Manufacture multiple grades of product with a single recipe.

Introduction

Many manufacturing processes produce different grades of final product simply by varying the order and quantity of raw material components. Designing traditional control systems for many final product grades requires maintaining a of manufacturing recipes or employing operators with specialized knowledge capable of adapting the recipe logic. This is due to the numerous possible combinations with multiple components and the need to produce a full range of final products. The challenge lies with maintaining this large collection of recipes. The open and highly configurable Yokogawa CENTUM Distributed Control System (DCS) makes it easy to design a system to consolidate recipes while still enabling flexible component additions.
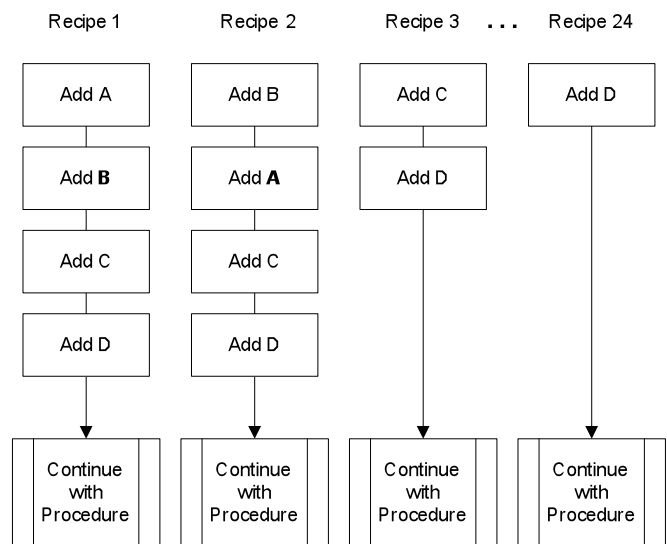
Benefits

◆ Reduces number of product specific recipes to maintain
◆ Eliminates operator requirement to build or modify recipes for similar products
◆ Provides immediate flexibility for process plant operations
◆ Simplifies the interface to higher level manufacturing systems for scheduling and production data archiving

Process description

For some processes, the manufacturing procedure remains largely the same from product to product. The difference is with the ordering of additions and the quantities of the raw material components. The traditional approach is to have a separate recipe per product, each with a variable number of component addition steps. While workable, this requires specially skilled operators or process engineers with knowledge of DCS configuration to maintain and modify these recipes. Also, when small adjustments or repeat additions are needed beyond what is included in the running recipe, it can be difficult to trick the system into performing these "minor" adjustments.

Conventional Component Addition
Multiple Individual Recipes

Recipe 1	Recipe 2	Recipe 3 ...	Recipe 24
Add A	Add B	Add C	Add D
Add **B**	Add **A**	Add D	
Add C	Add C		
Add D	Add D		
Continue with Procedure	Continue with Procedure	Continue with Procedure	Continue with Procedure

Application solutions

The Yokogawa CENTUM Distributed Control System (DCS) is a fully compliant ISA-88 Batch manufacturing control system. One of its many features which allow batch solutions to be developed quickly and easily is a configurable batch oriented display known as the Recipe Overview Screen. This display can easily be adapted to provide a customized, flexible component addition solution. By designing custom recipe screens with easy operator access, information about a component including lot number, desired charge quantity, storage location, and order of addition can be flexibly entered in one easy to understand place.

Custom Recipe Screen

■ **Simple to Customize**

Creating custom CENTUM Recipe Screens is as easy as building custom graphics screens.

Alphabet Soup Recipe			
Addition Order	Letter	Amount	Actual
1	A	10	11
2	C	20	18
3	D	30	29
4	B		

A universal master recipe procedure which consolidates the multiple component additions interfaces with the custom recipe screen. Operations within the recipe procedure repeatedly read information from the custom recipe screen until all components are charged. Optional prompting between additions allows for a component to be added back-to-back or added out of sequence. This also allows component additions for fine adjustments based on testing results during the batch. The system records the originally desired quantity of each component and the actual amounts, thus accounting for and allowing operator fine tuning.

Flexible Component Addition
Single Universal Recipe

Complexity is reduced because fewer master recipes need to be maintained for products with similar procedures but varying components. This removes the need for an operator to build and modify new recipe procedures. It also greatly simplifies an interface to higher level manufacturing execution systems. Only a few master recipes need to be linked between the DCS and the MES.

In addition to customizable recipe displays, Yokogawa's Batch Package features technology which allows Operations to execute different actions depending on their position within a recipe procedure. Furthermore, the Yokogawa logic can resolve tag names at run time using the generic name feature. A flexible component addition solution uses many of these built-in features of Yokogawa's Batch Package to turn the information entered on custom recipe screens into an ordered manufacturing procedure.

Conclusion

The Yokogawa CENTUM Distributed Control System has powerful batch production features including customizable recipe management screens and flexible application programming. These can be utilized to consolidate manufacturing procedures with varying component additions so that operations can gain greater flexibility and reduce the number of master recipes to maintain. Contact your Yokogawa representative to simplify your manufacturing procedures for multiple grade products.

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