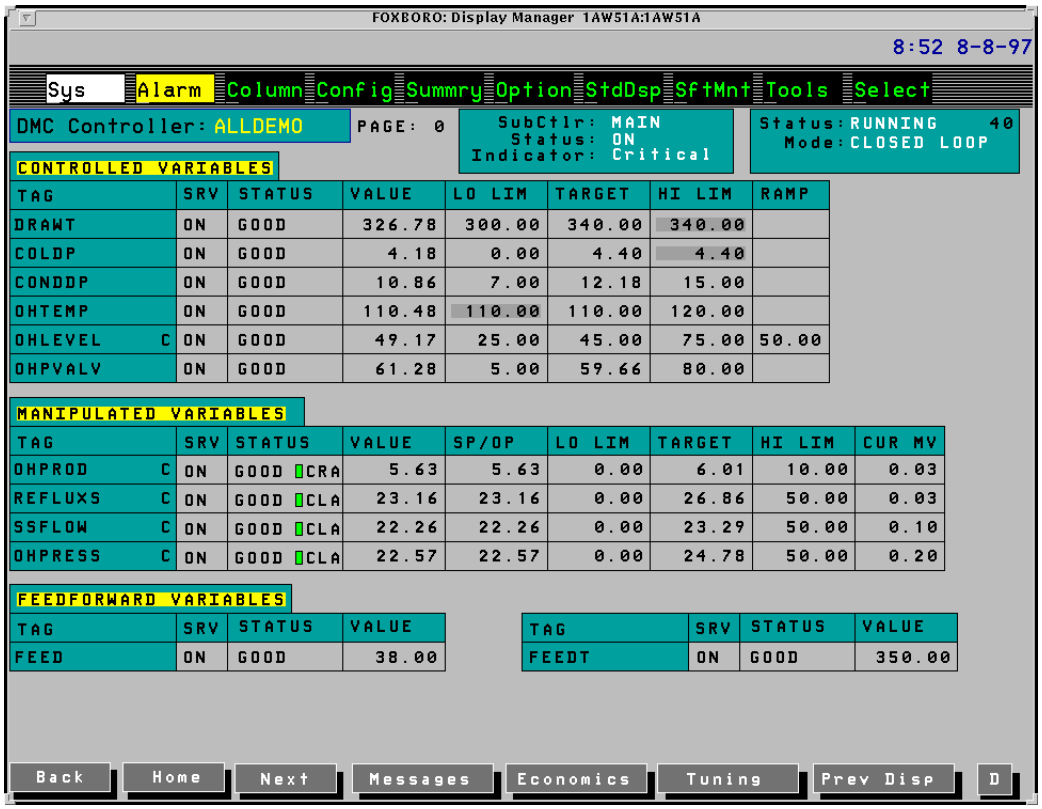
I/A Series® Software
DMCplus Connect and Bridge



The DMCplus Connect and Bridge for Foxboro I/A Series is a software package that provides full integration between Foxboro I/A Series systems and DMCplus multivariable control software. This software includes a set of CRT displays that allow operators and engineers to view complete DMCplus information using I/A Series FoxView or Display Manager. The creation of these CRT displays is automated. When the DMCplus controller configuration changes, these displays are automatically revised, so that they always match the current DMCplus control configuration. Special default displays for DMCplus parameters allow operators to view and trend complete DMCplus information, including predicted future values of controlled and manipulated variables. All DMCplus variables are fully integrated using I/A Series Object Management services. This DMCplus information is available by object name anywhere on the I/A Series system and can be transferred via a plant network to other applications.

BACKGROUND

The competition in bulk commodity production continues to accelerate. These production units often have highly interactive parameters, are subject to large disturbances and can be hard to control due to their own dynamic behavior. Many manufacturers have deployed “Model Based Predictive Control” (MPC) as part of their control solution.

MPC provides a framework for taking predictive control action within unit constraints. This is possible using empirical modeling techniques which provide predictions of future process dynamic behavior. The model results serve as a basis for deciding which variables to manipulate and how to do so. In the competitive environment of bulk commodity processing, MPC is implemented to provide maximum throughput, minimal waste, and an optimal production operating point. A solid layer of regulatory control is the foundation for the MPC application and provides the fault-tolerance and security required in a production environment.

I/A Series and DMCplus

DMCplus is a commonly used MPC software package. The DMCplus Connect and Bridge for I/A Series integrates this MPC package with I/A Series. The DMCplus package receives real-time process data, executes the MPC calculations, and periodically returns new setpoints to I/A Series control strategies running in Control Processors. A typical DMCplus cycle is executed as follows:

- TARGET OPTIMIZATION: A linear program determines the optimal steady-state condition that satisfies all constraints and control limits.
- PREDICTION: Real-time data showing current plant conditions is retrieved from the appropriate Control Processors; the dynamic process model is used to predict the magnitude and direction of future changes in the controlled variables.
- CONTROL MOVE CALCULATION: Using the model's prediction of future controlled variable trajectories, and the optimal control targets provided by the LP, the choice of future moves is made.
- IMPLEMENTATION: This set of moves is then sent to the appropriate Control Processors as new controller supervisory setpoints.

Product Features

This product consists of tools to automate the construction of DMCplus operator and engineer interfaces along with executables which contain the technology of both The Foxboro Company and Aspen Technology. These executables automatically generate interfaces that allow the DMCplus application to provide secure supervisory setpoint control to controllers operating in the I/A Series system. They also support mapping of DMCplus variables which allows the process engineer to treat DMCplus variables in the same way as native I/A Series system variables. Operators can view DMCplus variables directly, rather than trying to follow the underlying control system variables to which they are connected. Other supported functions are:

- DATA COLLECTION FOR MODELING: The product supports the collection of I/A Series Object Manager (OM) data in a format that is consistent with off-line DMCplus model building requirements (see Figure 1). Data files can be transferred using standard network services or manually.

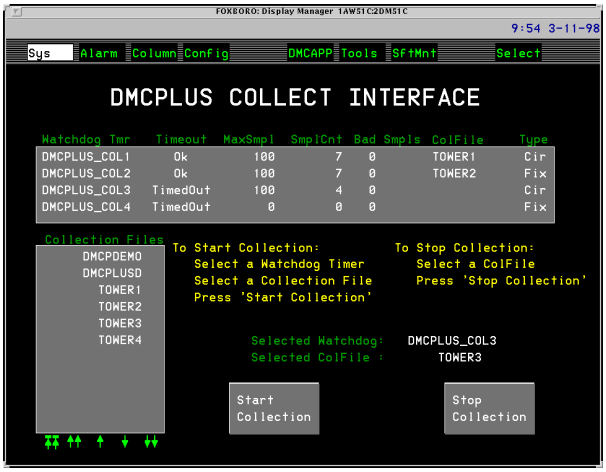


Figure 1. DMCplus Data Collection Display

- RUN-TIME INTERFACE: The product supports a library of functions that make the DMCplus Controller an integral part of the I/A Series control structure.
- CONFIGURATION: Configuration consists of cross-referencing the DMCplus tags to the I/A Series blocks. From this file, all DMCplus displays and object files are created.
- I/A Series OBJECT CREATION: Objects are automatically created after configuration is accepted. Rules governing uniqueness of compounds and objects within a compound are similar to those for control blocks and are checked automatically before the application object is created.
- DISPLAY SUPPORT: All available DMCplus objects are supported with I/A Series standard detail displays and their parameters are automatically connected to these displays. Since future moves of Manipulated Variables and predicted values of Controlled Variables are supported as I/A Series objects, they can be historized and trended by the I/A Series system and appear in any I/A Series operator interface (see Figure 2). Default CRT displays of all DMCplus object types are also supported.

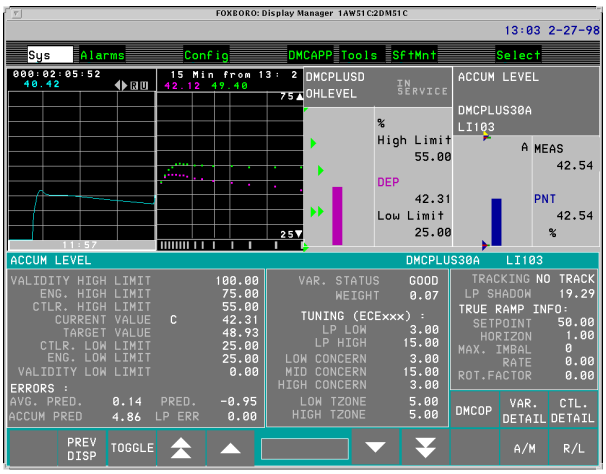


Figure 2. Controlled Variable Default Display

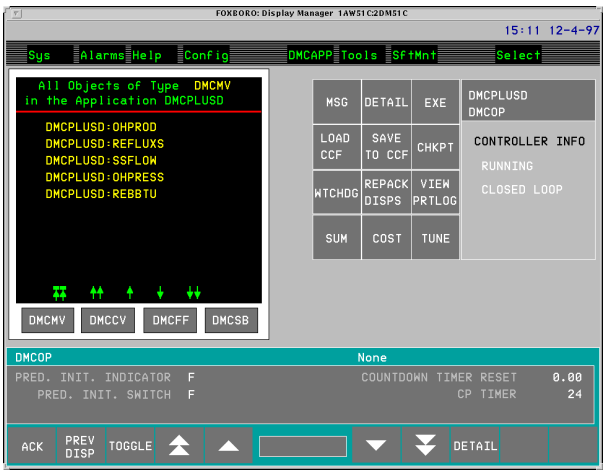


Figure 3. DMCplus Controller Operation Display

- SUPERVISORY SETPOINT CONTROL (SSC): The product supports SSC services which ensure secure operation between I/A Series and supervisory applications such as DMCplus.
- SUBCONTROLLER OPERATION: The DMCplus Bridge provides display sets for ease of SubController operation. The SubController detail display shows all information for one SubController and the list of SubControllers display allows access to all SubControllers.
- DMCPlus MESSAGING: The DMCplus Bridge Message display shows the most recent 24 messages from the controller. Print File options are available to save a day's worth of print files in a rotating queue.
- CONTROLLER OPERATION: The Controller Operational Detail Display provides many options for viewing and maintaining the Controller (see Figure 3). The Manipulated, Controlled and Feed Forward Variables can be viewed as well as SubControllers. The most recent Print File can be viewed and CCF loading and saving can be selected.

DMCplus Bridge Performance and Sizing

The DMCplus Controller performance on the I/A Series processors is dependent on the size of the controller, the controller interval, and the type of I/A Series processor hosting the DMCplus Bridge.

SUPPORTED I/A Series PLATFORMS

DMCplus Host Server Requirements

AW51B/C/E, AP51B/C/E
Minimum of 96 MB RAM
Minimum of 2 GB disk
4 mm tape drive
Solaris 2.4 or later operating system

I/A Series Software

Release 4.1 or later

DMCplus Versions Supported

Version 1.0 and later

DMCplus Client Workstations

AW51A/B/C/E
WP51A/B
AW50
WP50
WP30
WP20

DMCplus Supervisory Control Interfaces

- CP10/30/40 (All I/A Series Versions)
- INTERSPEC Integrator to CCMs
- Advanced Control Computing Platform (ACCP) to SPECTRUM UCMs
- SPECTRUM Master Gateway (dedicated with single processor, non-redundant only) to SPECTRUM UCMs

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MB 021 Printed in U.S.A. 0598