Sequencia Partner Tools

20 Minute OpenBatch Review

20 Minute Review

- Suggested use
  - This is intended to show some of the basic functionality of OpenBatch and explain some of the concepts of batch automation
    - It lists the high points of the product
    - It shows some of the typical product screens
  - The first time through run through this slowly,
  - Run through this quickly for a review

Batch Automation Elements

- There are three basic elements involved in batch automation

1: Defining the basic processing capability of the equipment

2: Defining recipes for products

3: Making batches

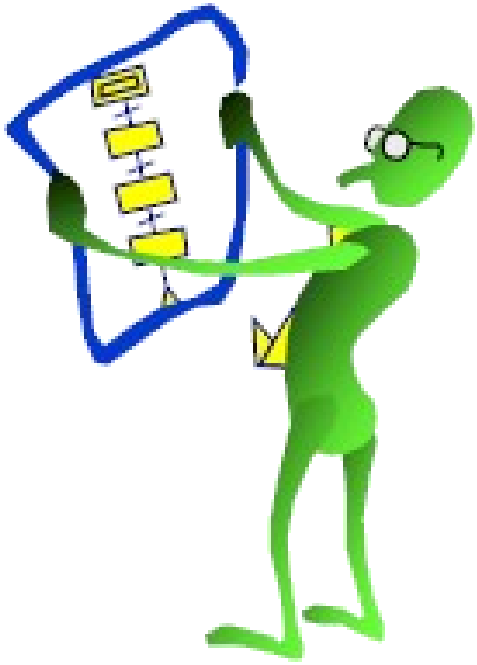
- This is all based on the international standard for batch control systems

  ISA S88.01 (also known as IEC 61512-01)

Batch Automation

Click here anytime to return to this screen

Click here to go immediately to Defining Equipment Capability



Click here to go immediately to Recipe Definition

Click here to go immediately to Batch Execution

Equipment Capability Definitions

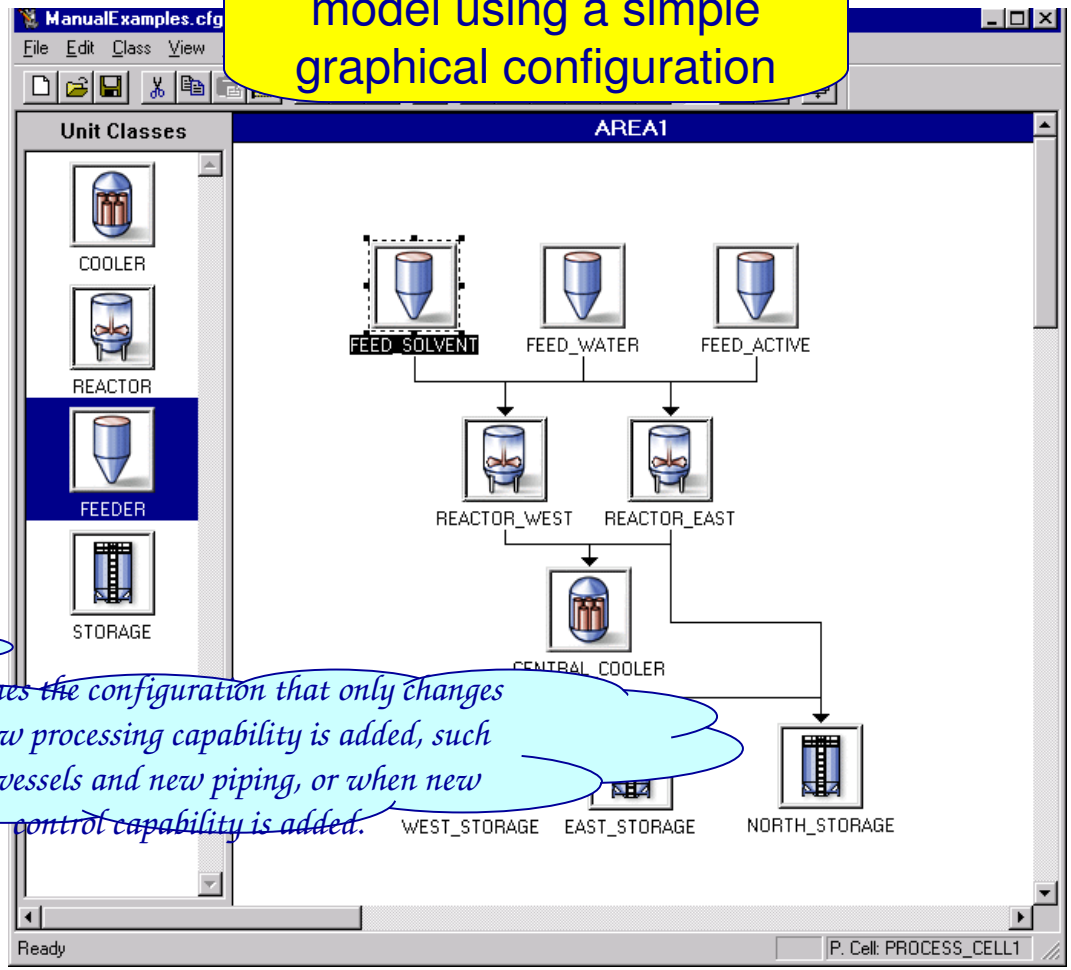
- The basic capability of the equipment must be defined
  - Capability that is usually product independent
  - Such as; heating, cooling, charging, mixing, transferring, …
  - Associated to specific equipment
- Capability may be performed automatically or manually
- Defined using the Equipment Editor

Equipment Definition

Equipment Editor

- The equipment editor is run, off-line, to define what the equipment is capable of doing
- You also use the equipment editor to define the mapping (addresses or names) to the PLC and DCS systems that implement the functions

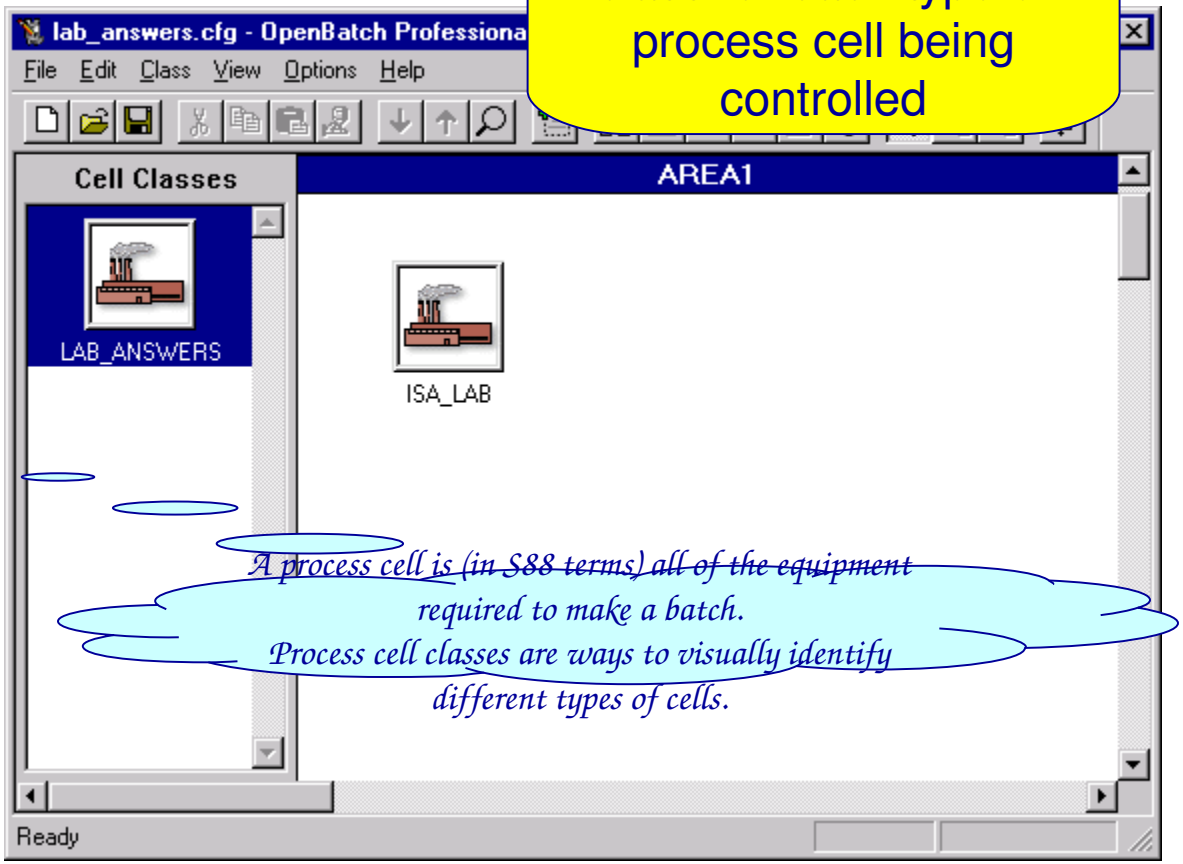
Define the equipment model using a simple graphical configuration



This defines the configuration that only changes when new processing capability is added, such as new vessels and new piping, or when new control capability is added.

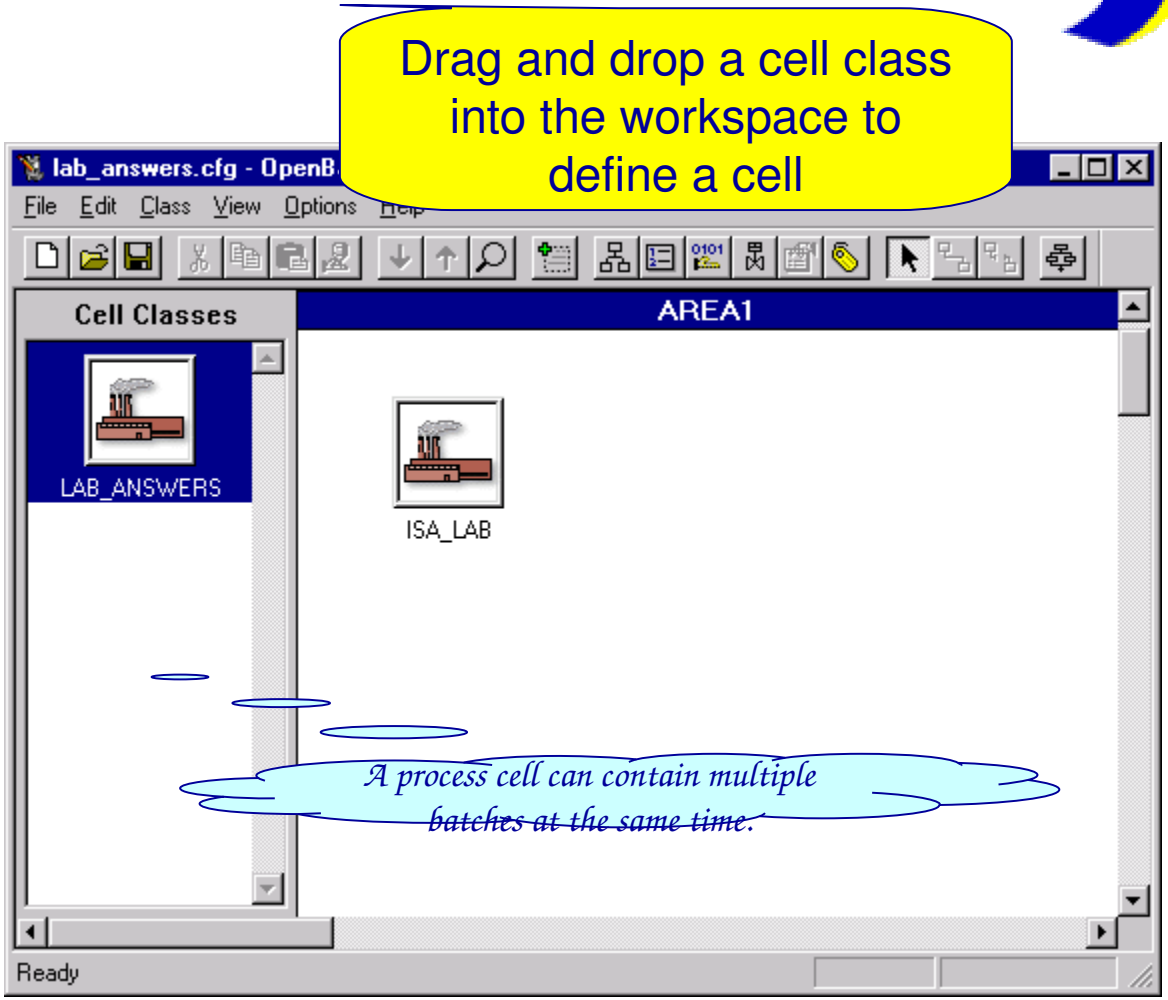
Top Level - Process Cells

- Batches run to completion in a process cell
- This follows the S88.01 equipment hierarchy model
  - Process cells
  - Made up of units
  - Units contain equipment phases
- Each OpenBatch server can support multiple process cells



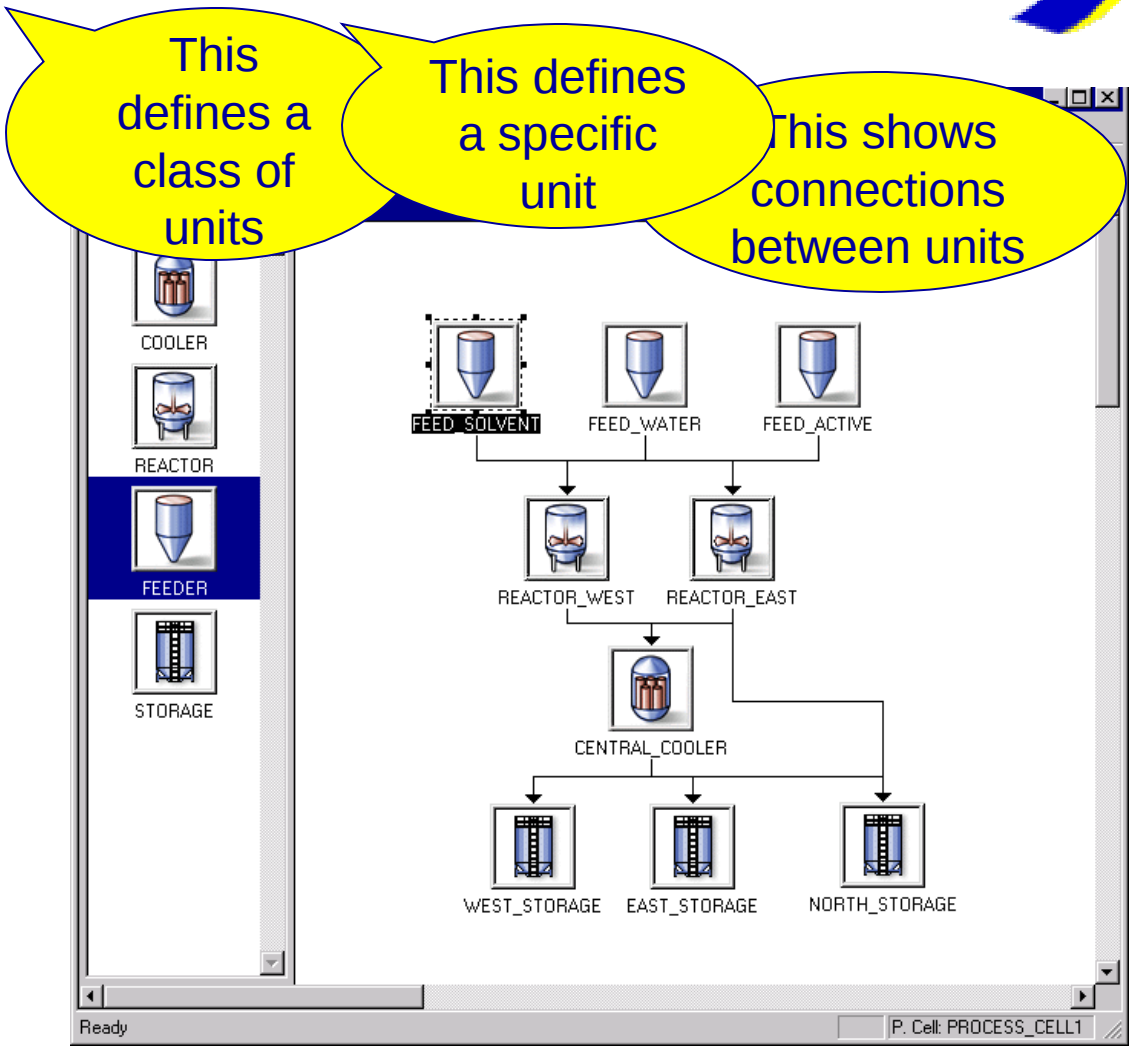
Drag and Drop Configuration

- Starting an equipment model is a simple process of creating a process cell class and then creating a specific cell
- Icons represent the process cells, units, and equipment phases



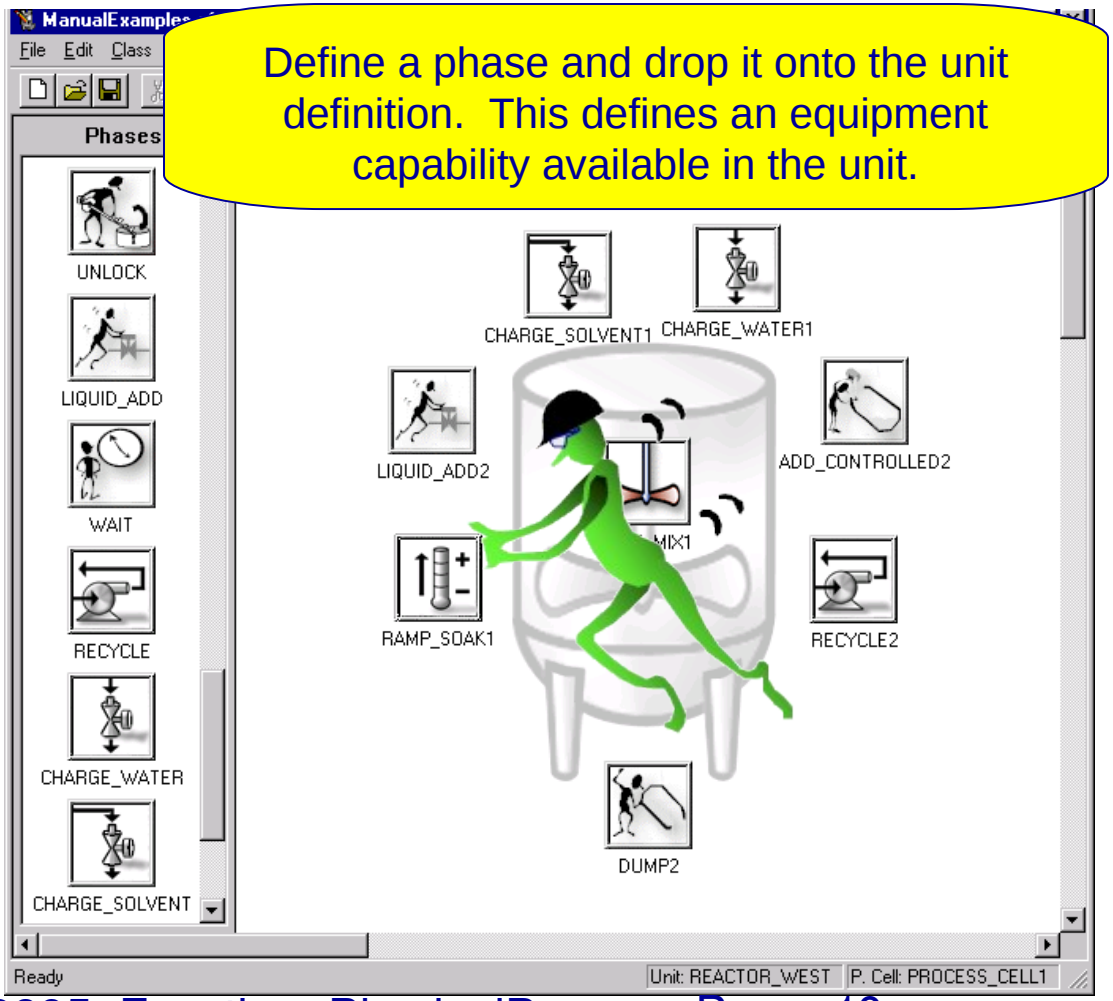
Define Units and Flow Paths

- Create units the same way
- A unit operates on only one batch at time
- A unit performs major processing actions on a batch
- Define connections between units to show flow paths of materials



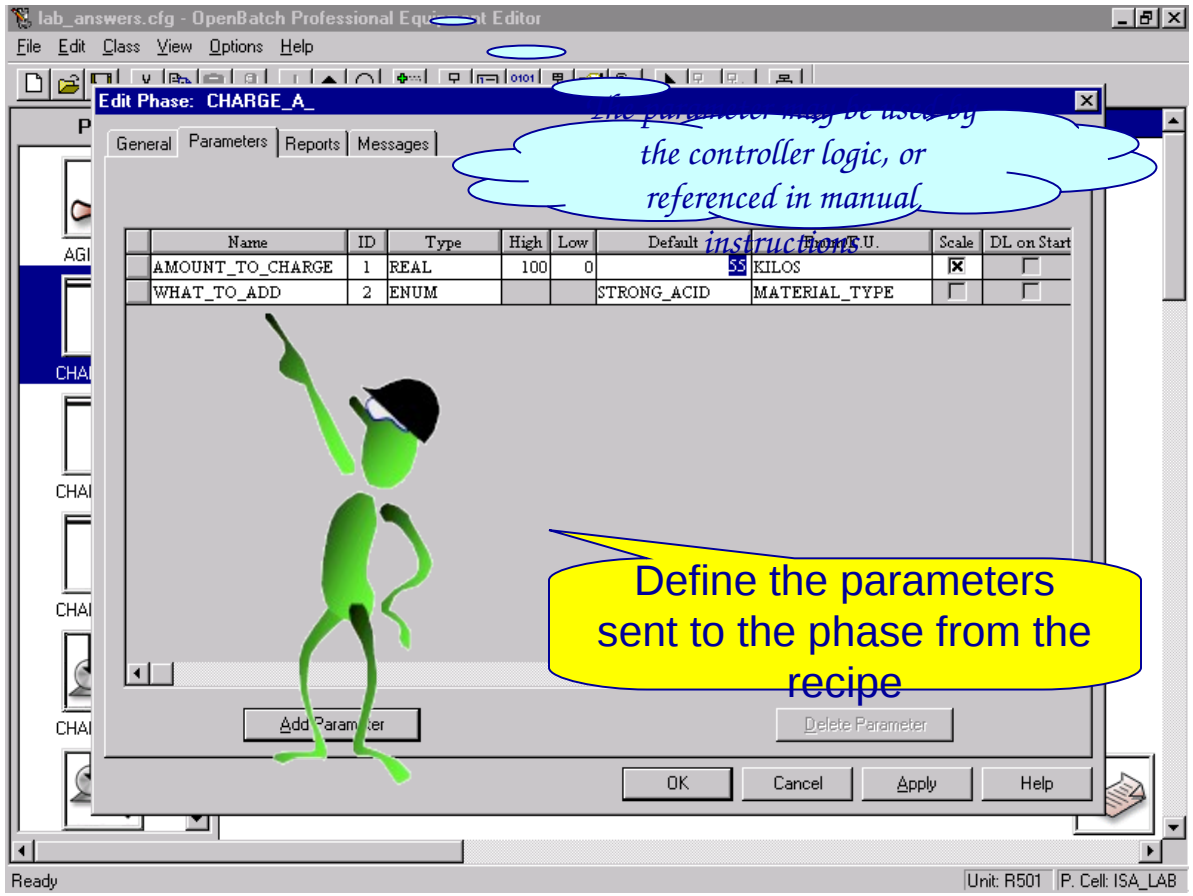
Equipment Phase - Basic Equipment Capability

- Equipment phases define what the basic processing equipment is capable of doing
  - Such as heating, mixing, adding ingredients, transferring materials, …
- Each phase is a minor processing action on the batch
- It does not matter if the function is performed manually or automatically

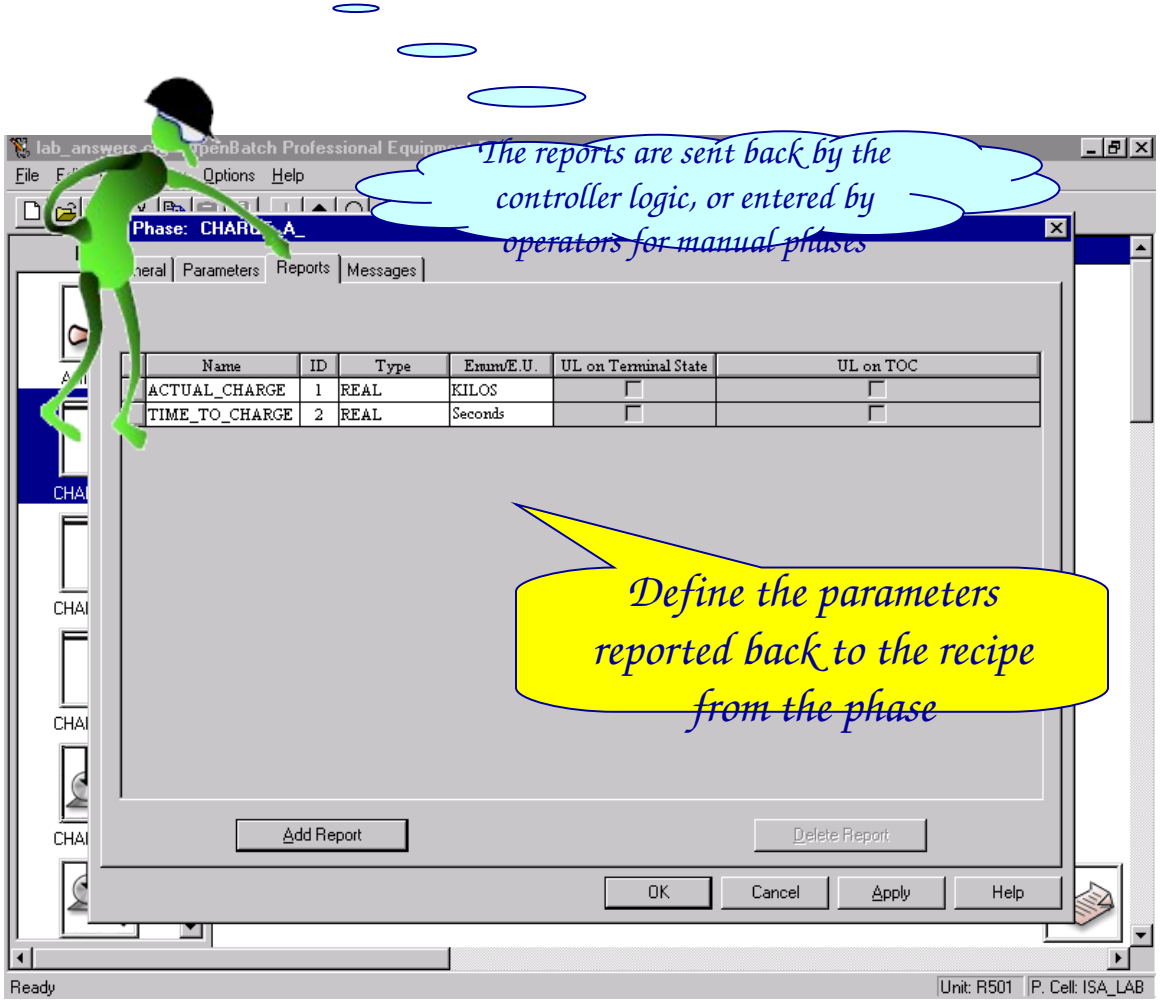


Phase Parameters

- Phases may have parameters
- Parameters define information to be sent to the phase before it executes
- Examples are
  - temperature setpoints
  - materials to be added
  - amount to be added
  - mixing times
  - heating times
  - ...



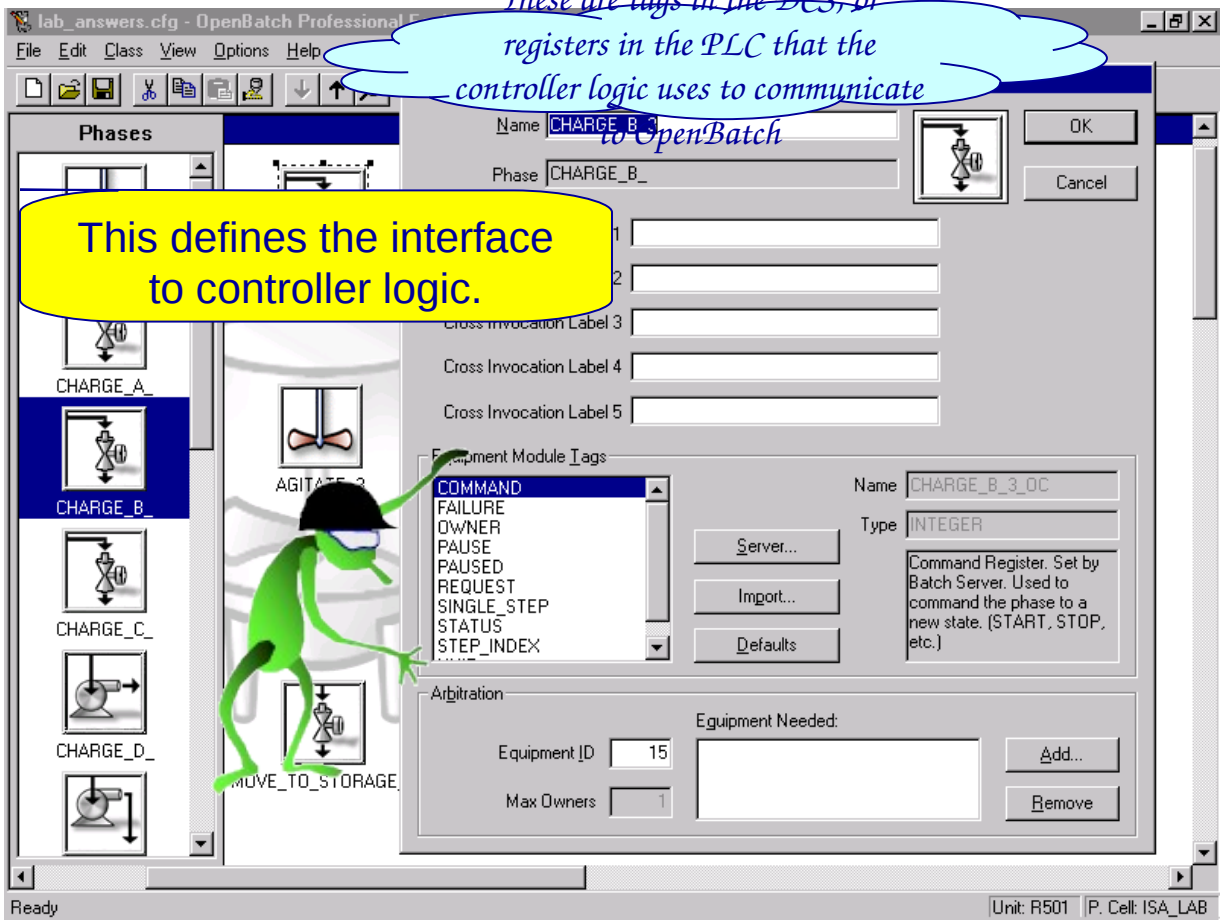
Report Parameters



- Phases may report back values during or after their execution
- Such as
  - Actual amount added
  - Actual temperature
  - Actual pressure
- Report parameters may be manually entered by the operator or automatically collected by control equipment

Equipment Interface

- The equipment editor is where you specify the interface to the control equipment for the phase
- The interface can be DDE or OPC to PLC or DCS systems
- The interface may be an annotated SOP document for manual operations using Procedure Manager

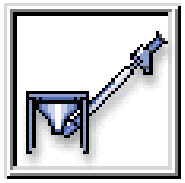


Manual or Automated Functions

- Equipment phases may be executed in control equipment, such as DCS or PLC systems
- Equipment phases may be executed manually, where instructions are presented to operators using Sequencia's Procedure Manager

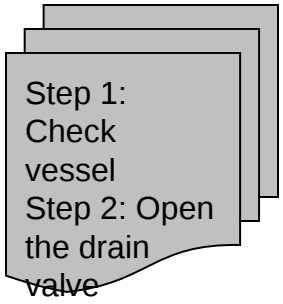
Manual Phase

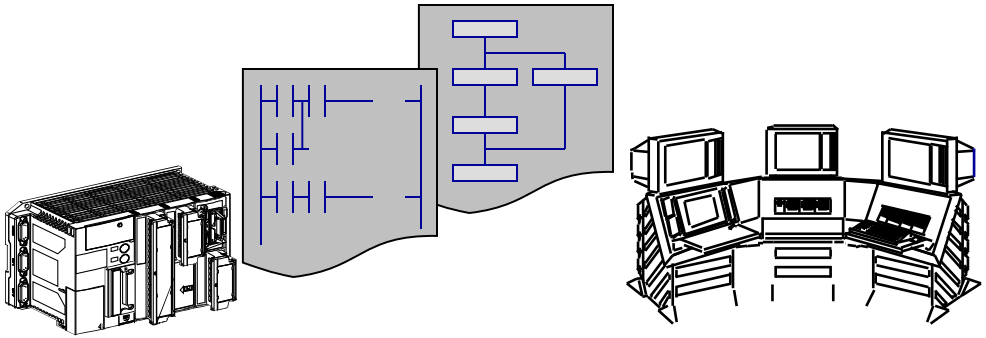
Identify document that specifies how to accomplish the function



Automated Phase

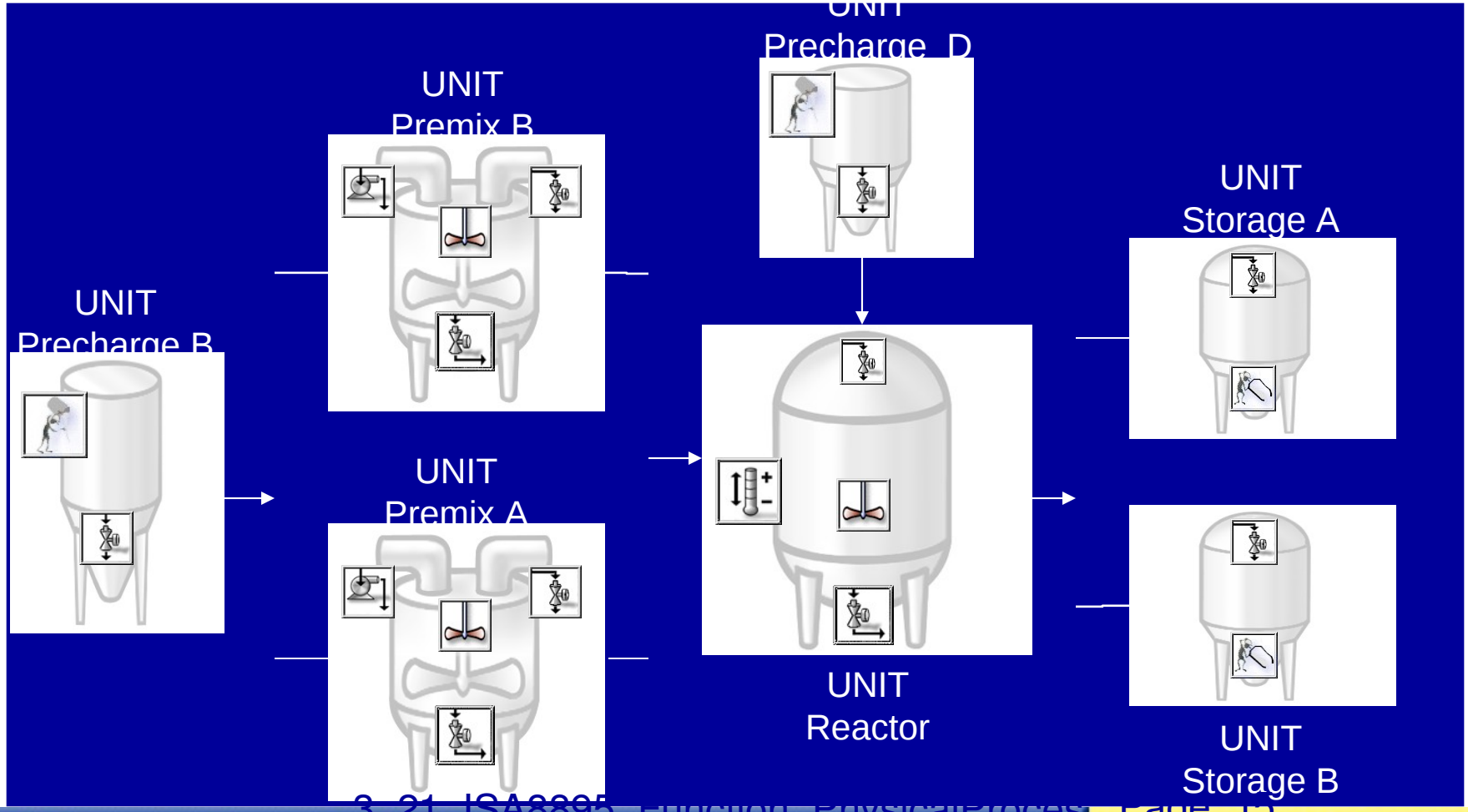
Identifies the data exchanged with a section of code in the controller that implements the function





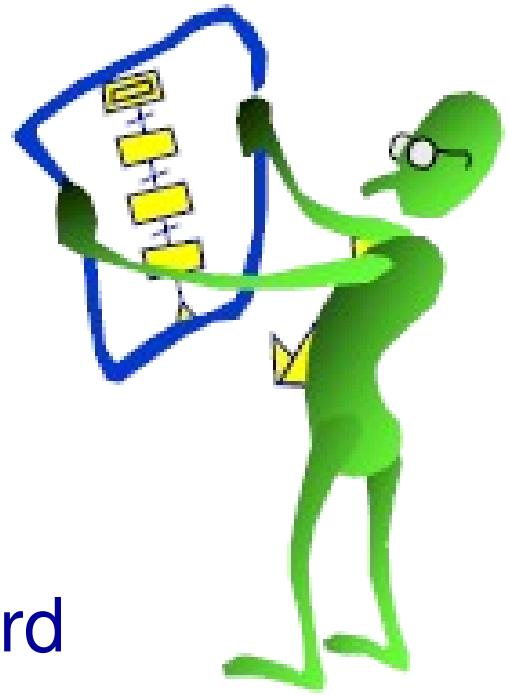
A Full Equipment Model

Process Cell



Recipes

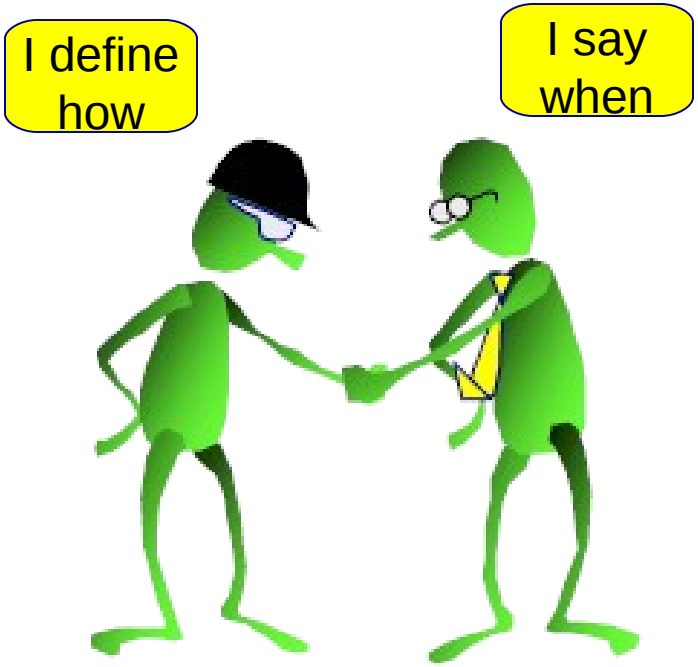
- Recipes define how to make products
- Recipes are created using the Recipe Editor
- Recipes are executed in the OpenBatch run time system
- Recipes follow the S88.01 standard



Recipe Definition

Recipes and Equipment

- Recipes use the equipment information defined in the Equipment Editor
- Recipes define the ordering and sequencing of the equipment phases
- The recipes specify when the phases are to run, but the equipment phases do all of the real work

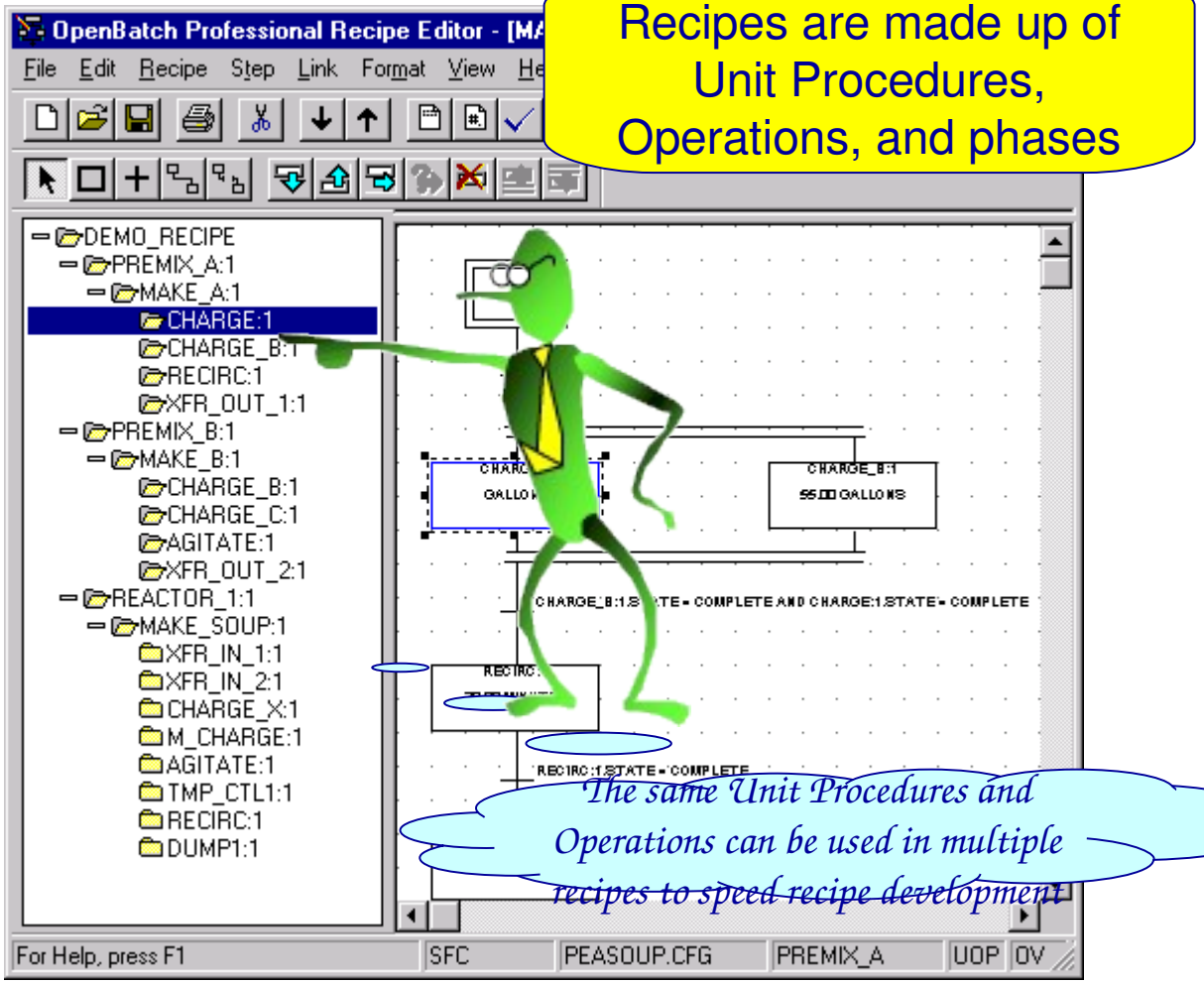


Recipe Format

- Recipes are created, and displayed in a graphical format called SFCs - Sequential Function Charts
- This format allows the easy display of sequential steps, alternate steps, and parallel steps

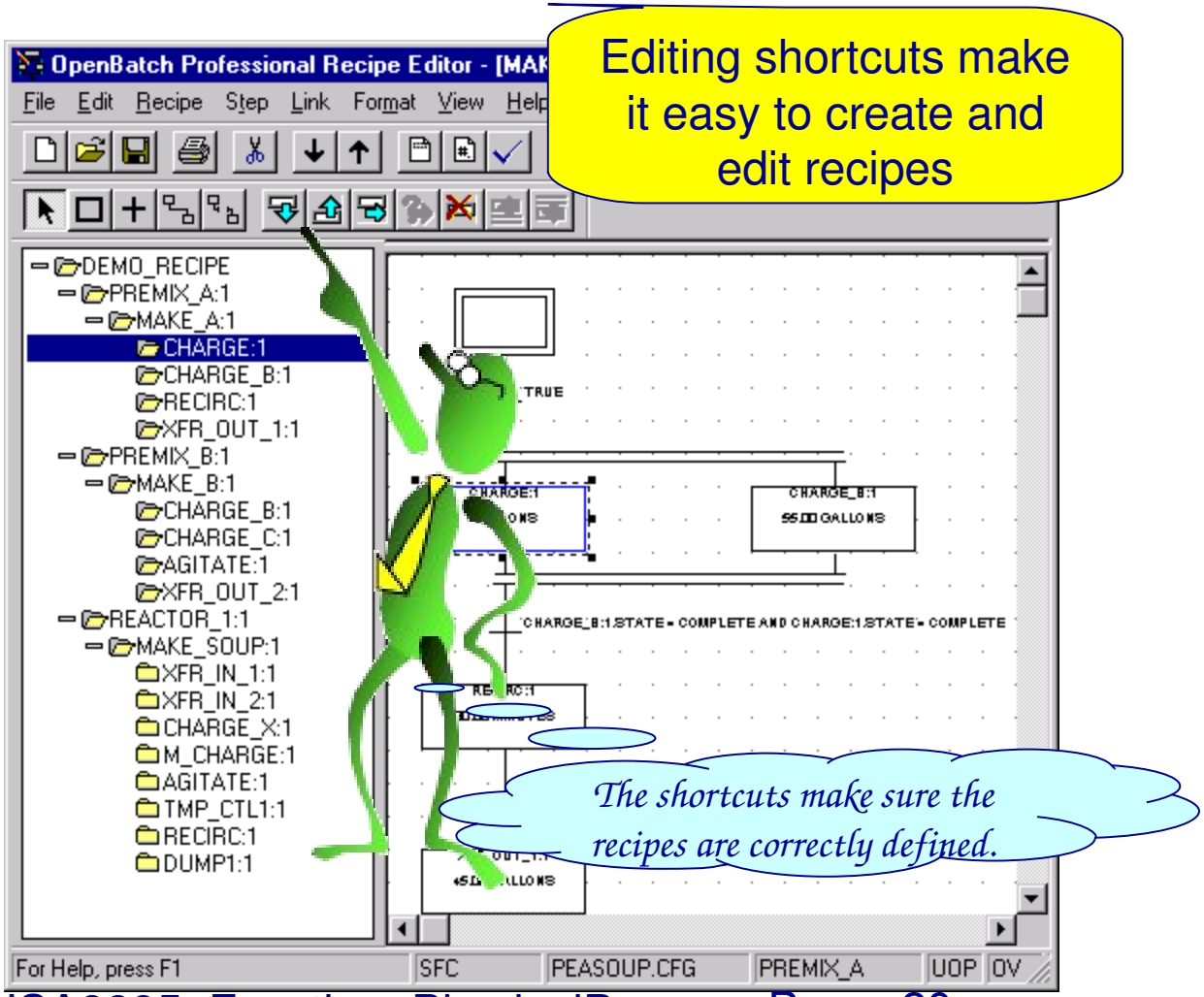
Recipe Editor

- The recipe editor is used to create and modify recipes
- Usually there is one recipe per product
- The main part of a recipe is the "PROCEDURE"
  - The ordering of actions required to make the product
- The procedure is structured according to the S88.01 model



Rapid Editing

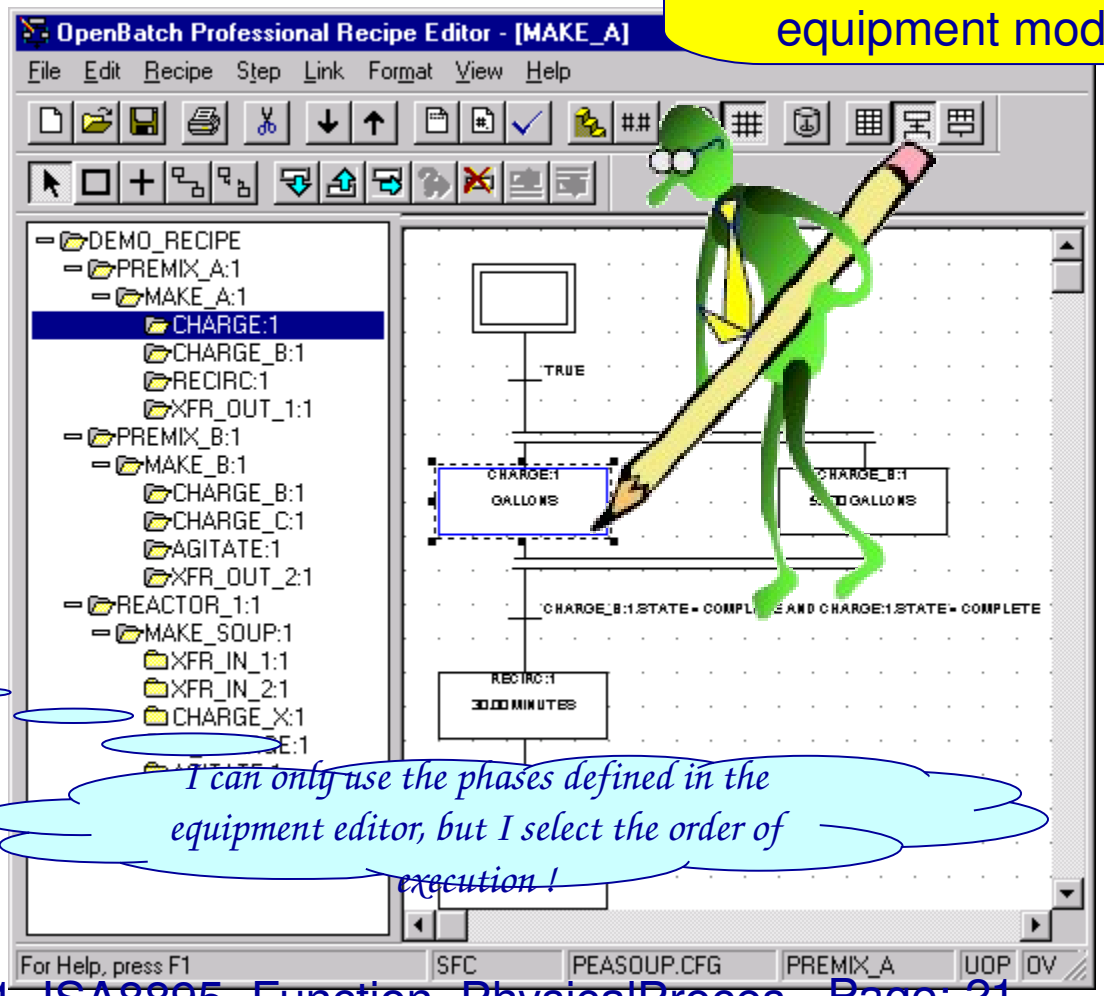
- The recipe editor has features to make recipe creation and editing easy and error free.
- Recipes can be modified at any time and made immediately available for execution.



Recipe Editing

- The lowest level of the procedure is a "Recipe Phase"
- A recipe phase references an equipment phase
  - For a specific piece of equipment
  - Or for a class of equipment

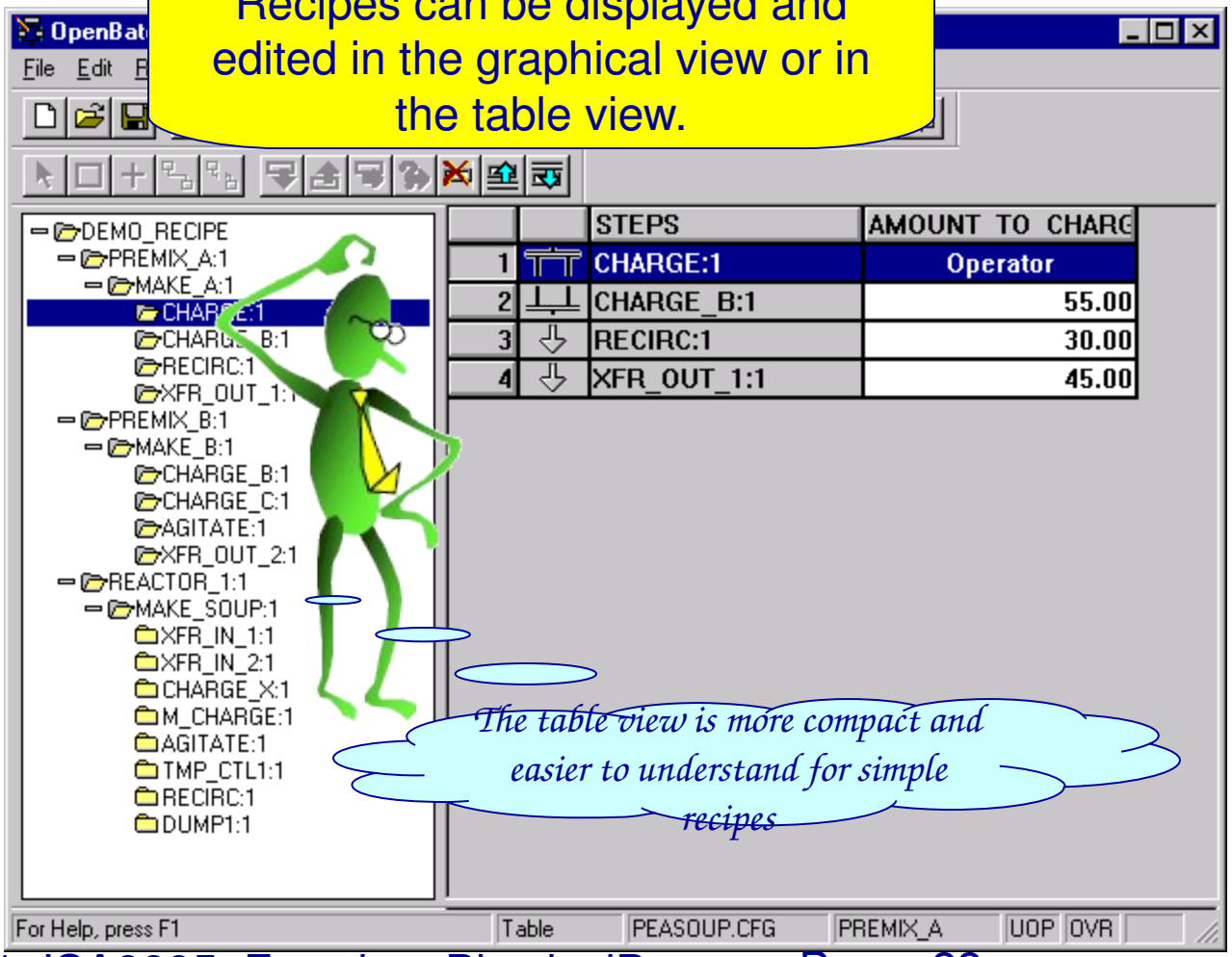
Recipes use the phases defined in the equipment model



I can only use the phases defined in the equipment editor, but I select the order of execution !

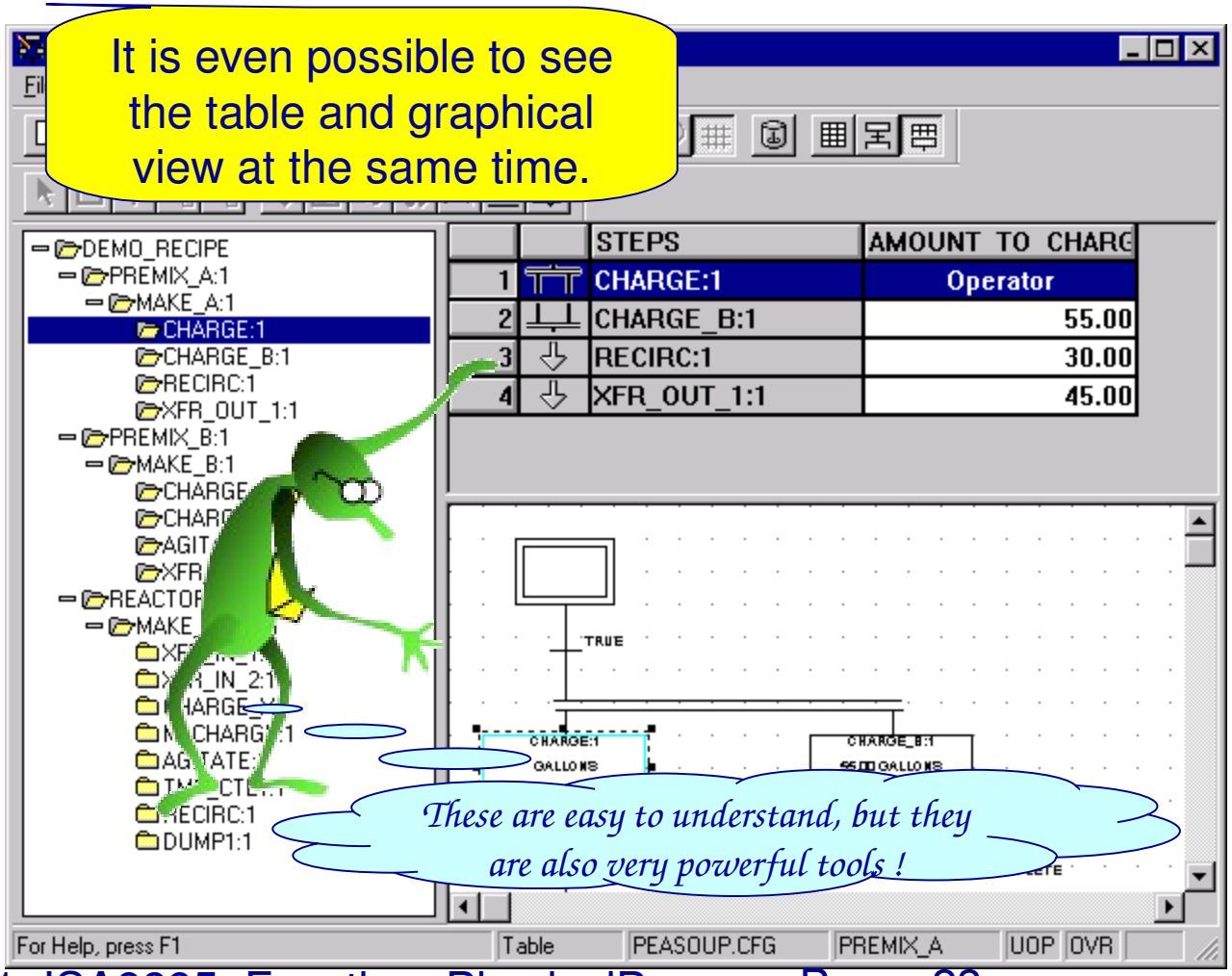
Recipes in a Simple Table Format

- Simple recipes require simple display
- So simple recipes can be displayed in a table format for occasional users



Multiple Views

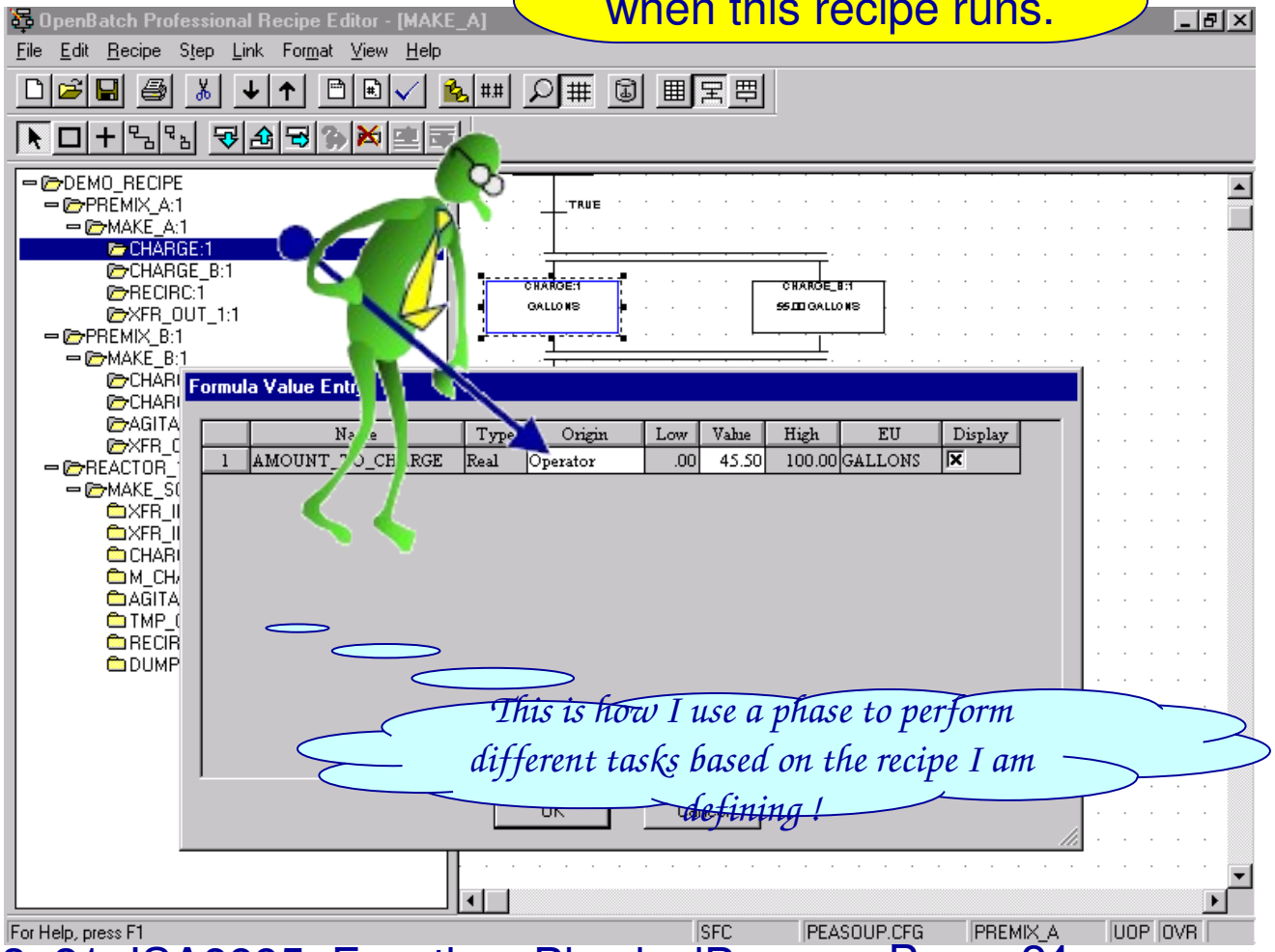
- You can even show the table view and the graphical SFC view at the same time
- Using the recipe editor, recipes can be created in very short times
- Using the alternate views, recipes can be read and reviewed by people not familiar with OpenBatch



Phase Parameters

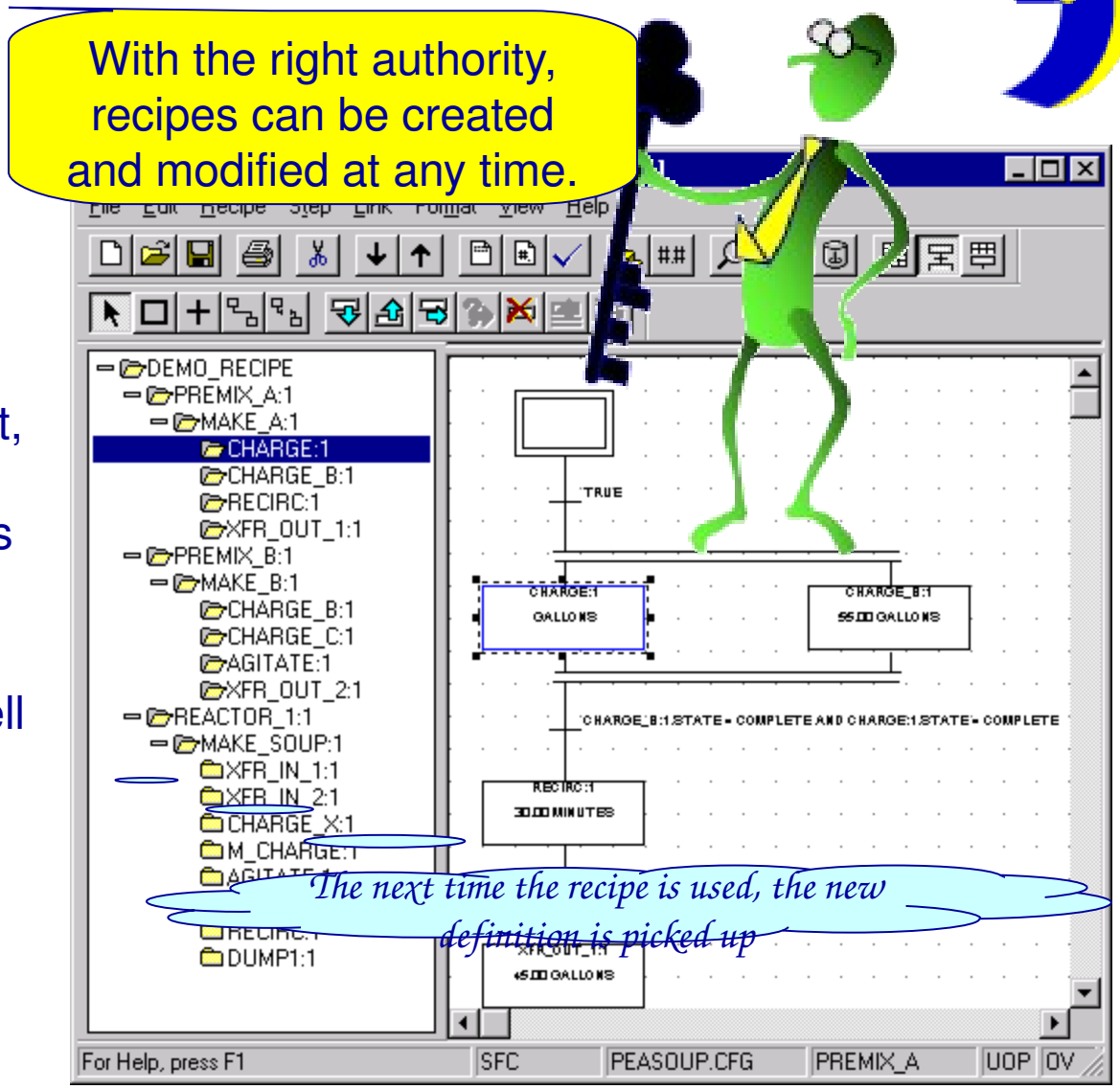
Define the parameter values that will be sent to the equipment phase when this recipe runs.

- When you create a recipe you can specify the specific parameters to be sent to a phase before it executes
- Such as a temperature setpoint, or the amount of material to add



Recipe Summary

- Recipes are the key element of batch automation
- They define how to make a specific product, without specifying how the underlying functions are preformed
- OpenBatch includes other information as well
  - Formula values
  - Author identification
  - Comments
  - Equipment requirements



Batch Execution

- OpenBatch is not just a recipe editor, it also executes the recipes
- There is a run-time component of OpenBatch that runs recipes under operator control

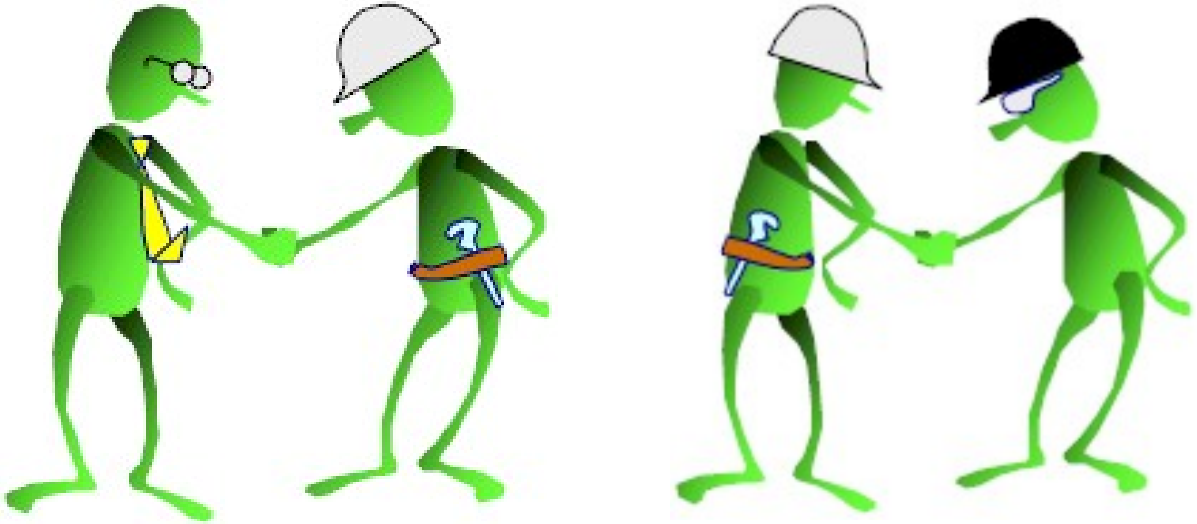
Batch Execution

Recipes and Operations

- Operations is where it all comes together
- Operators execute batches and select equipment they will run against

I will use your recipe definitions

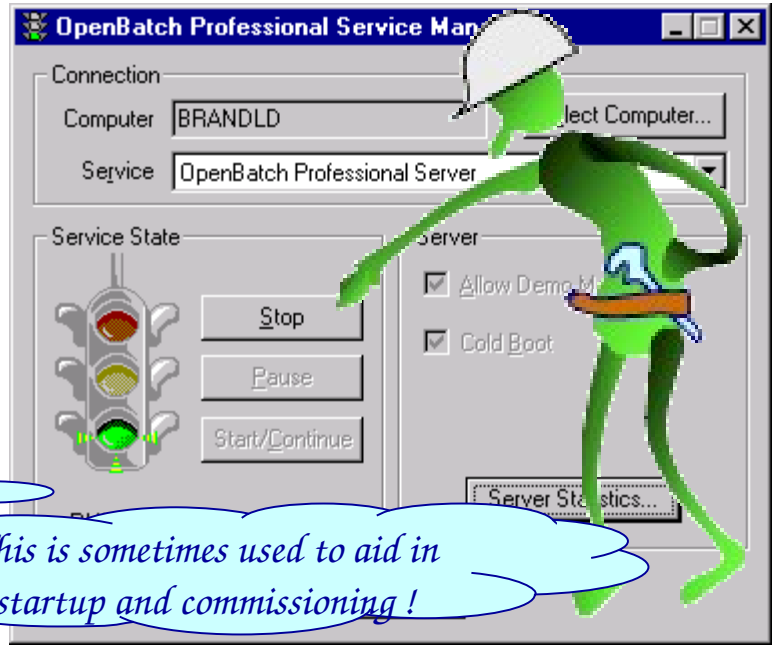
I will use your equipment definitions



Batch Execution

Usually the OpenBatch server is configured to auto start, so I don't have to worry about this software stuff

- Batches are executed in the OpenBatch run time system
- OpenBatch runs as a Windows-NT service
  - OpenBatch can auto start, so no operator intervention is required
- An OpenBatch server can communicate to multiple PLC and DCS systems to control multiple process cells
- OpenBatch uses DDE and OPC to communicate to control equipment



Operation - Batch List

- The Batch List is usually shown as an Active-X control in an HMI, or in a WEB Browser

This shows what equipment the batch is running in.

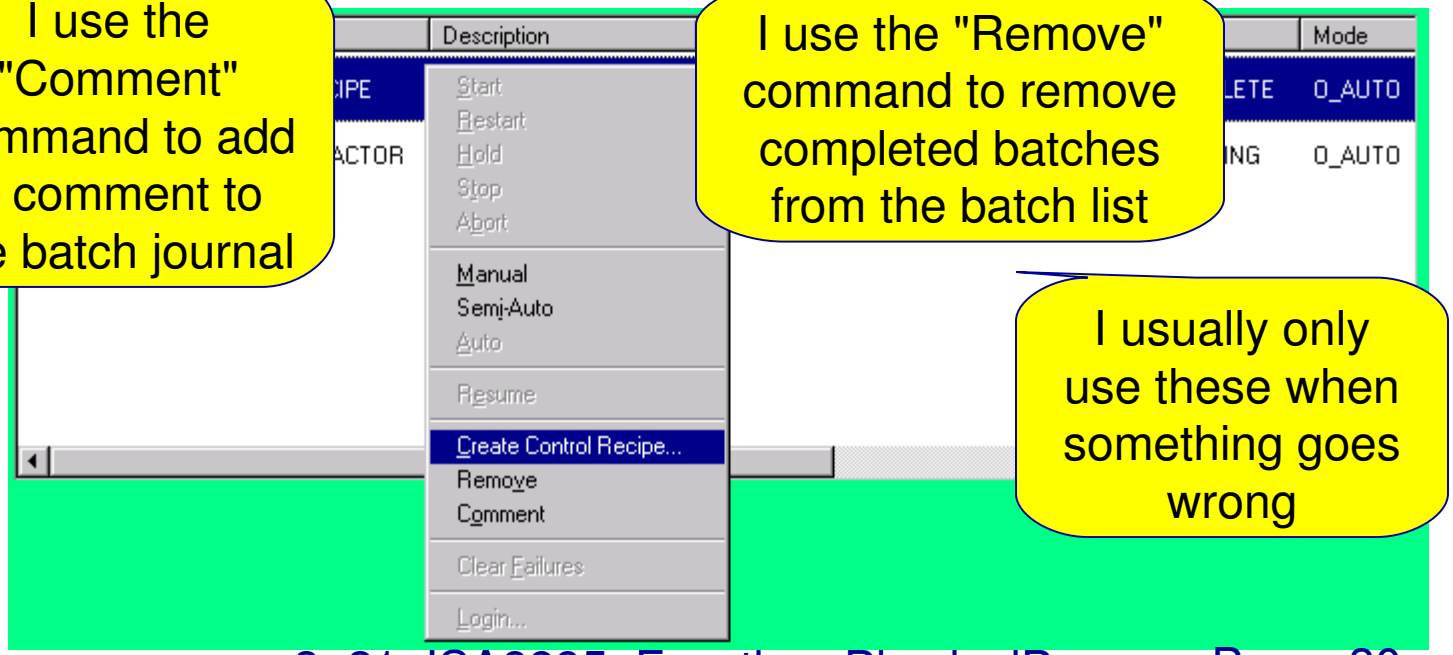
Batch ID	Recipe	Description	Start Time	Elapsed Time	State	Mode	Failure	Process Cell	Units In Use
T55272	DEMO_RECIPE	PEA SOUP		0:00:00	IDLE	MANUAL		PEA_SOUP1	PREMIX_B,PREMIX_A,REACTOR_1
T663483	CLEAN_REACTOR	CLEAN THE REACT...		0:00:00	IDLE	MANUAL		PEA_SOUP1	REACTOR_1

Operation - Controlling Batches

- A simple right click brings up the menu to add and control batches
- Batches can run in manual, semi-automatic, or automatic mode
- Operators can start, hold, restart, stop, or abort batches
- the correct privileges

I use the "Create

I use the "Comment" command to add a comment to the batch journal



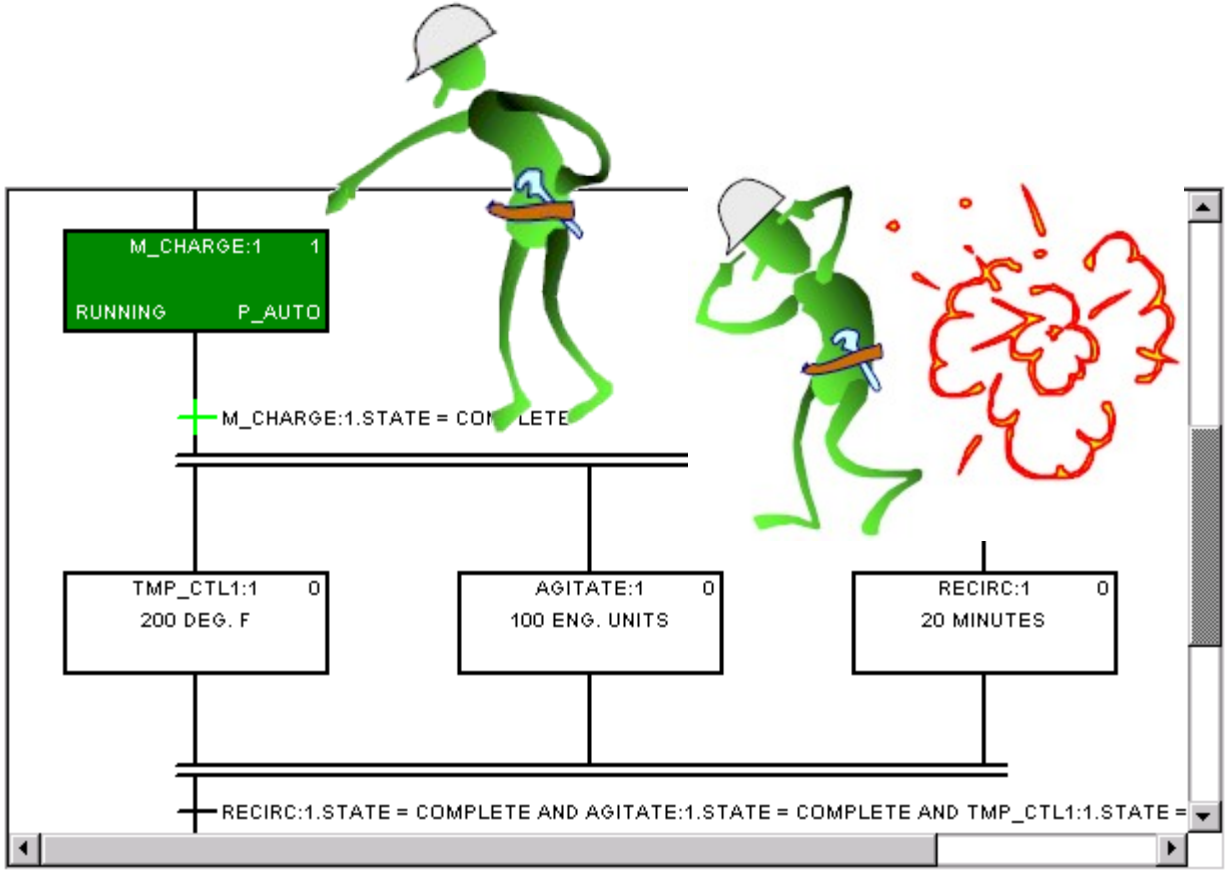
I use the "Remove" command to remove completed batches from the batch list

I usually only use these when something goes wrong

Operations - Recipe Procedure

I usually only control the order of execution when something goes wrong

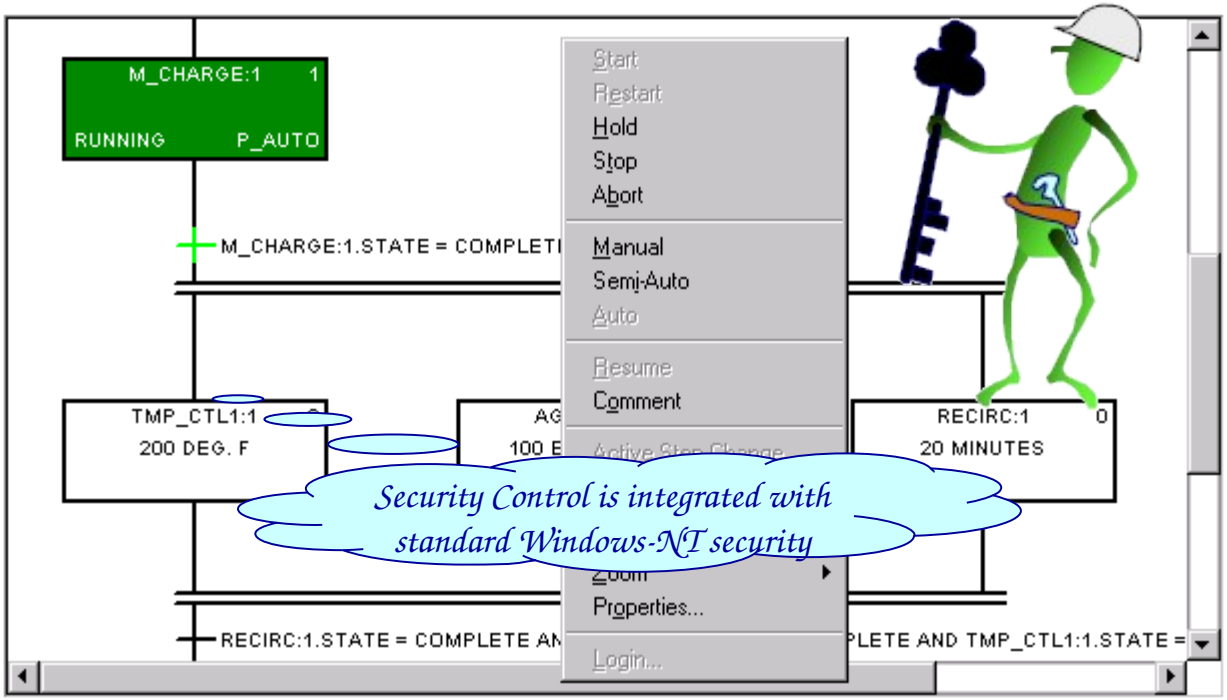
- Another Active-X control is the procedure view
- This can also be included in any HMI display to display and control a specific batch's recipe



Recipe Procedure - Control

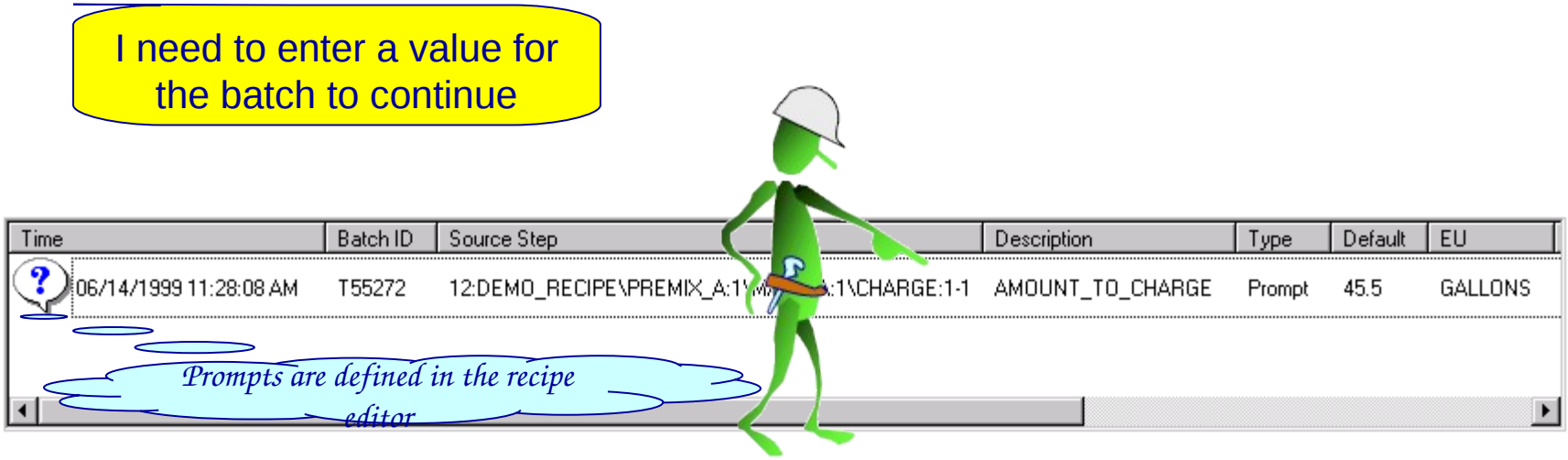
Performing these actions require I have the right security privileges

- Right click to bring up the menu to co e
- These can also be easily configured as buttons
- The newest version of OpenBatch further integrates these controls into your HMI or DCS displays



Operations - Prompts

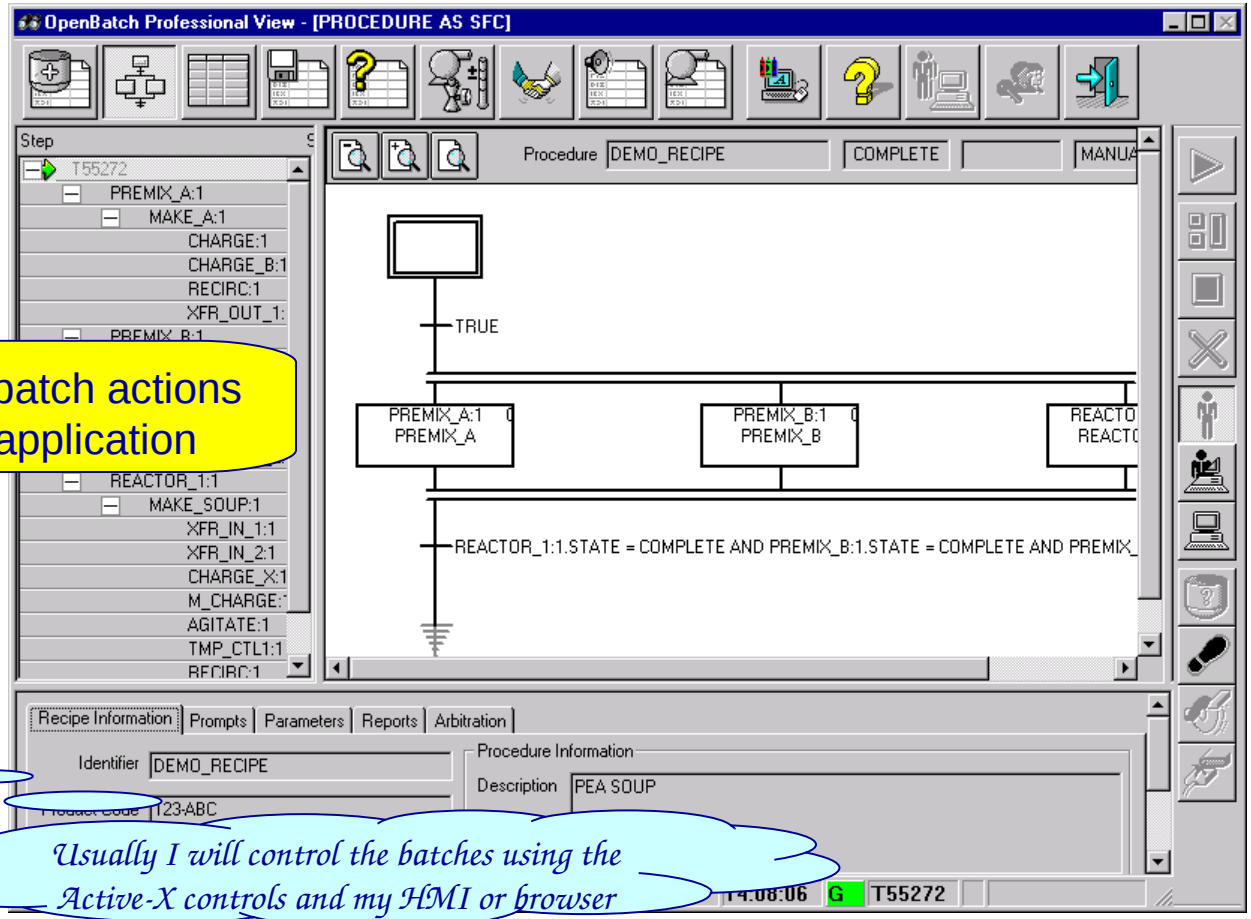
- When Procedure Manager is not installed, then the "Prompt List" Active-X control provides access to "prompts"
- Prompts are requests for values from the operator
  - These are report parameters that the operator must supply for the batch to continue



Classical Operations View

- OpenBatch also has a stand alone operations interface
- All of the previous functions, as well as additional functions for debug provided by Windows-NT application

I can do all batch actions from this application



Usually I will control the batches using the Active-X controls and my HMI or browser

Batch Journals and Reports

- OpenBatch also collects all of the information about the execution of a batch into a batch log
- Reports can be built against the batch log, or the information can go into a database for analysis

This information is very valuable, and it is automatically recorded.

The electronic batch log means I need to do less paperwork !

OpenBatch Programs

- The following programs are provided with OpenB
- Not all programs ne installed on all comp
- OpenBatch runs as client server archite
  - Editing may be do any computer on the network
  - Viewing may be done from any computer network

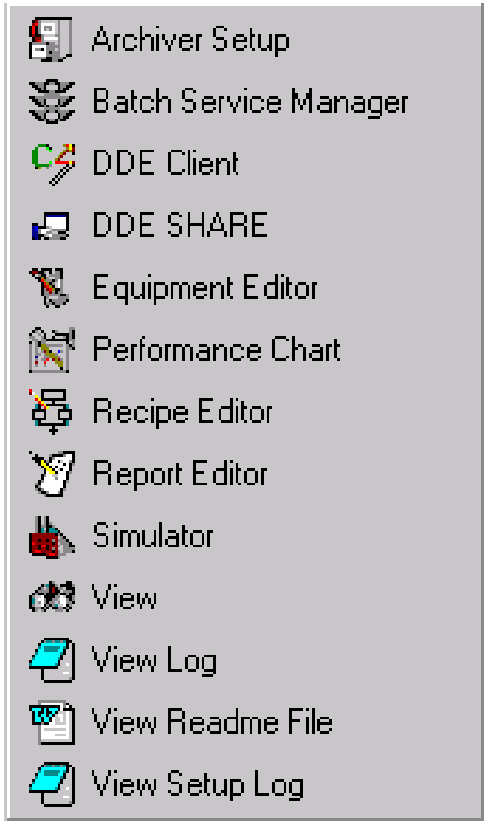
The Archiver saves the batch log into a database batch server

This starts the equipment editor

This starts the recipe

This starts the report editor

This starts the standalone OpenBatch viewer



Operations Summary

- OpenBatch is recipe execution, batch logging, batch reporting, and recipe editing
- Sequencia provides complete solutions for batch automation
  - OpenBatch
    - Recipe execution
  - Production Manager
    - Manual and semi-automated operations
  - Procedure Manager
    - Integration with ERP systems

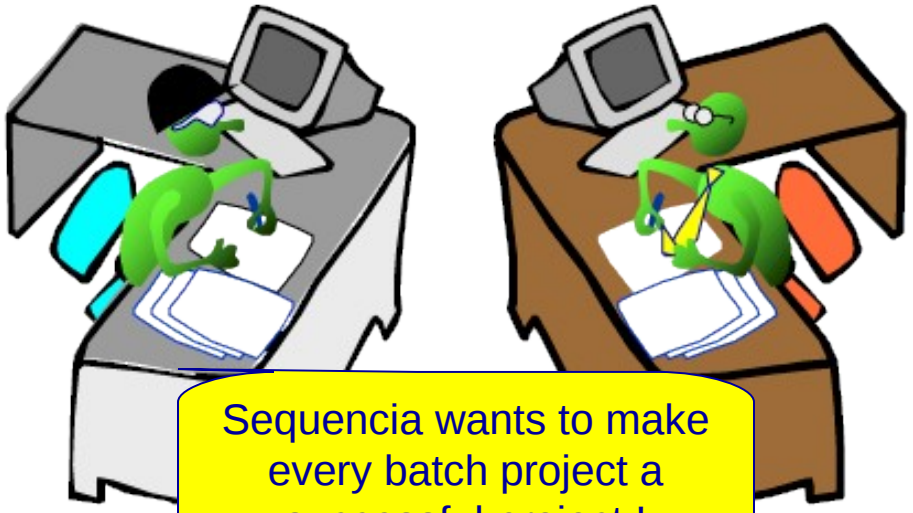
OpenBatch is the open solution. They work with all major control vendors.

OpenBatch works with Honeywell, Rockwell, GE, Aspen Technologies, Siemens, Ci Technologies, and many others.

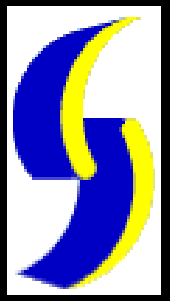
Services and Training

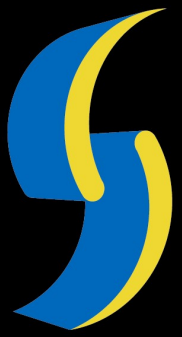
- Least we forget, Sequencia also offers services
  - Help in defining the equipment layout and organization
  - Help in defining the phases
  - Help in initial recipe building
- And Training
  - On site
  - Any Sequencia office

Sequencia has a large staff of batch experts to help.



Sequencia wants to make every batch project a successful project !





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