S88批处理的概念和应用

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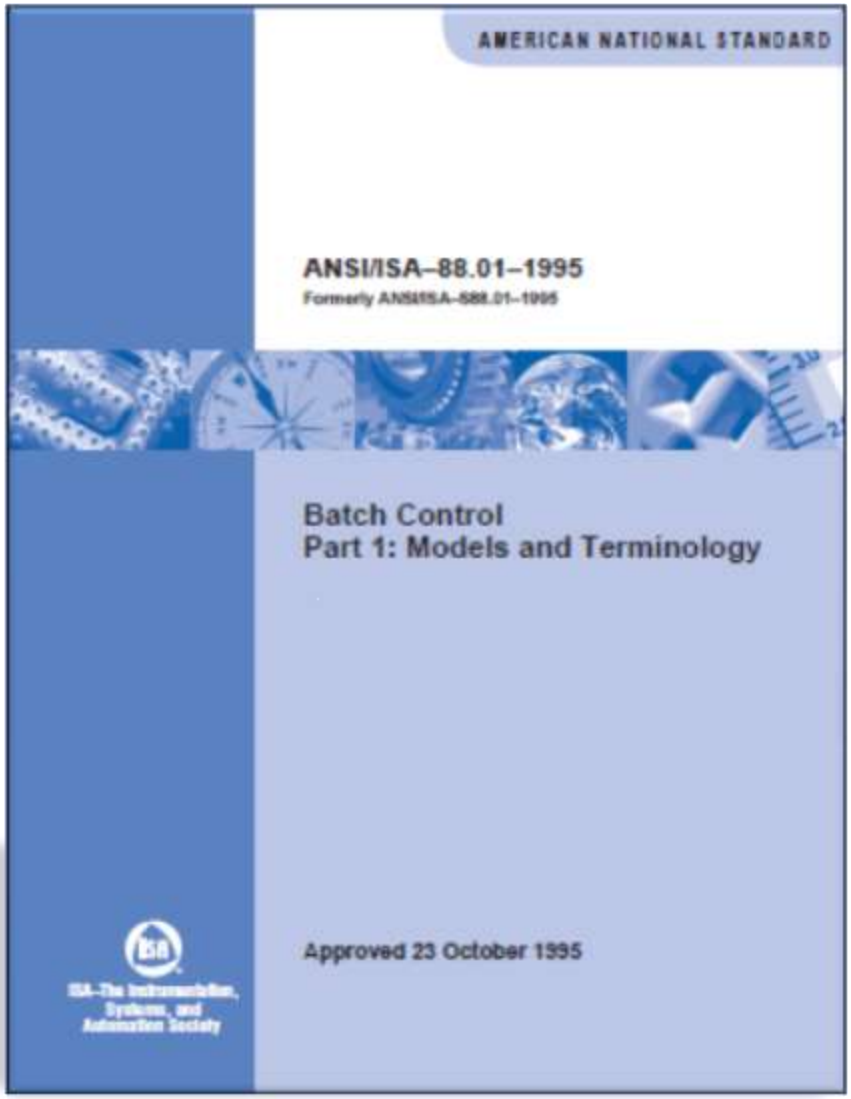
批处理背景知识

- 什么是批处理
- 批处理应用领域:
  - 精细化工
  - 制药行业
  - 食品饮料
- 为什么要用批处理：
  - 合规的灵活性
  - 调度、协调与效率
  - 数据与报告的整合
  - 工艺优化

Batch标准： ANSI/ISA-88



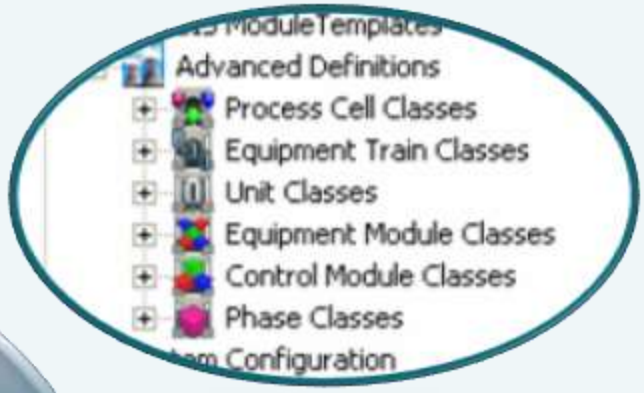
Area

Process Cell

Unit

Equipment Module

Control Module

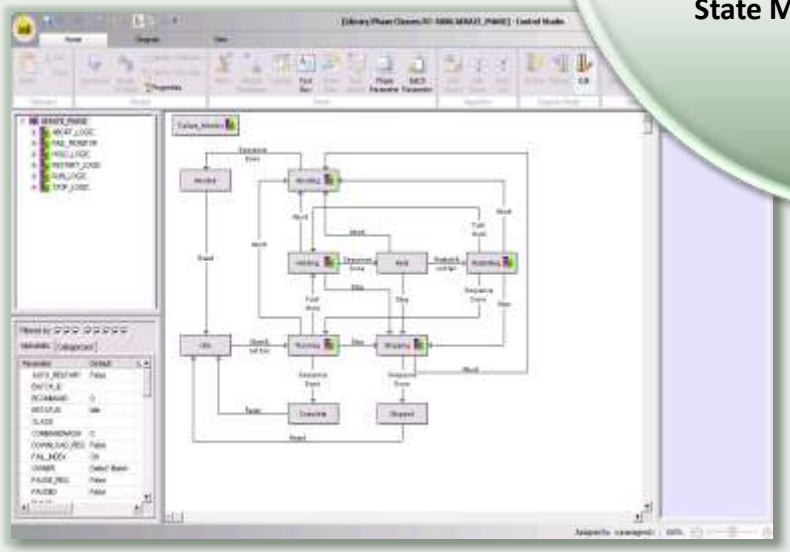


S88 Physical Model

Class-Based Configuration

Embedded State Model

S88 Procedural Model



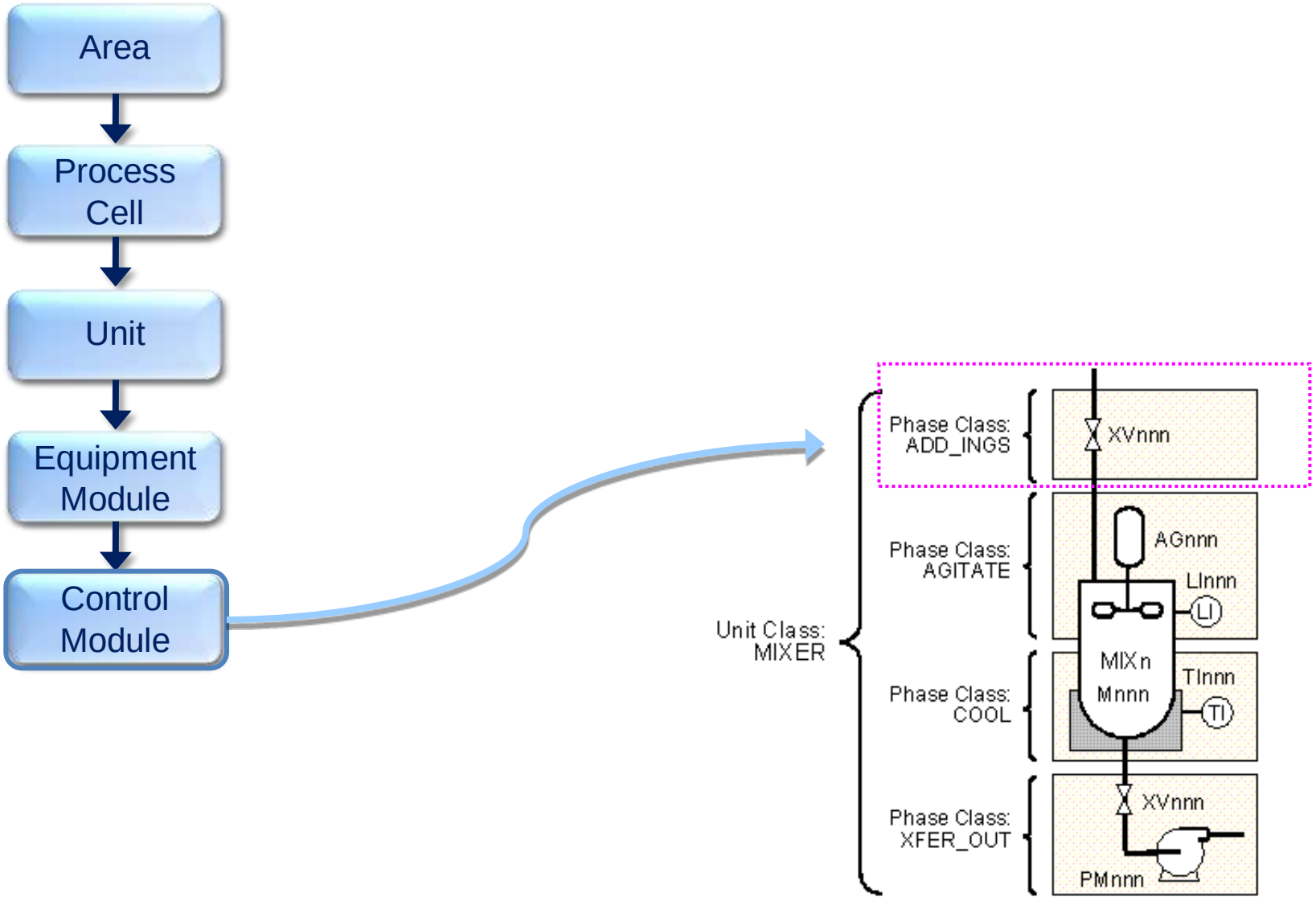
Procedure

Unit Procedure

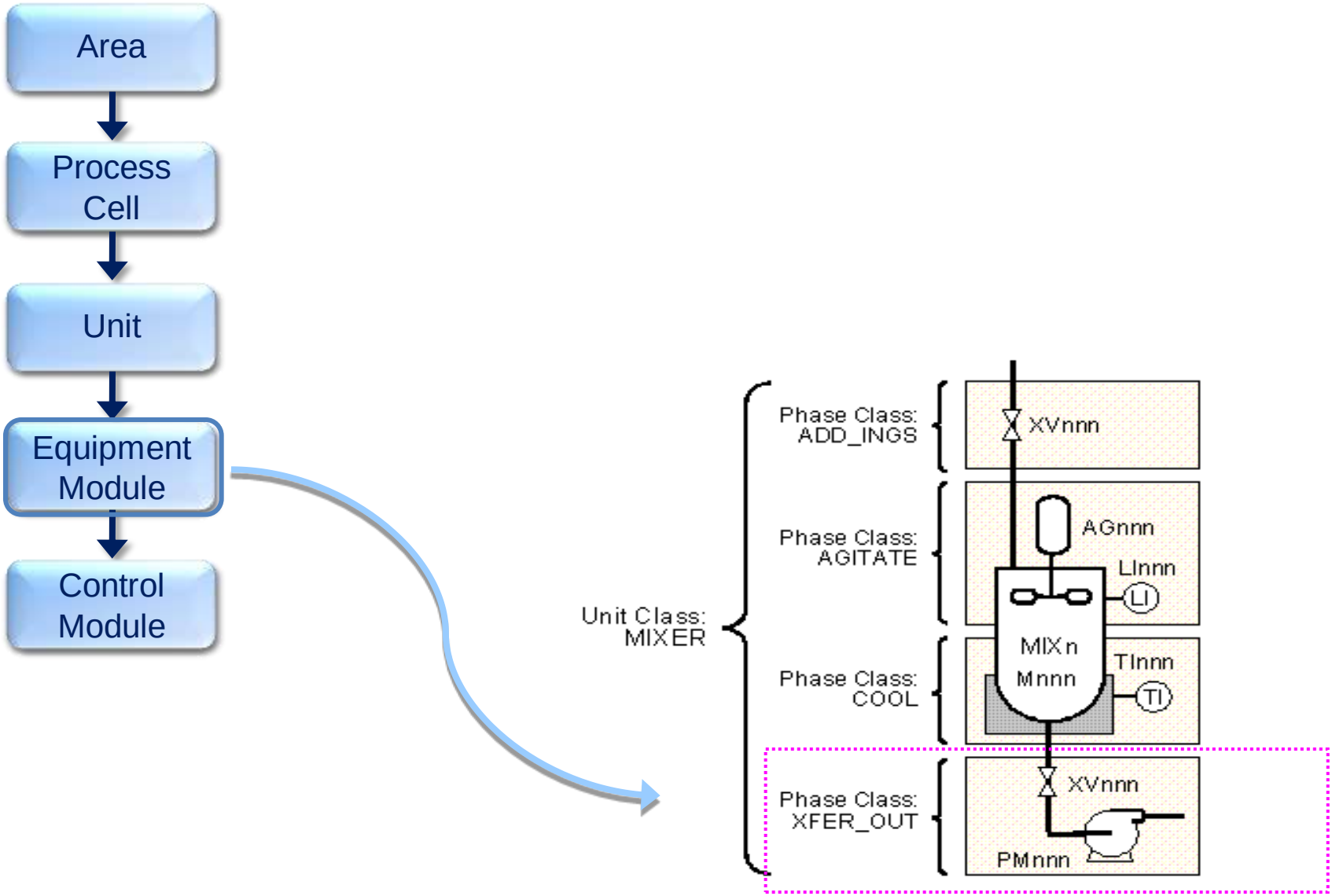
Operation

Phase

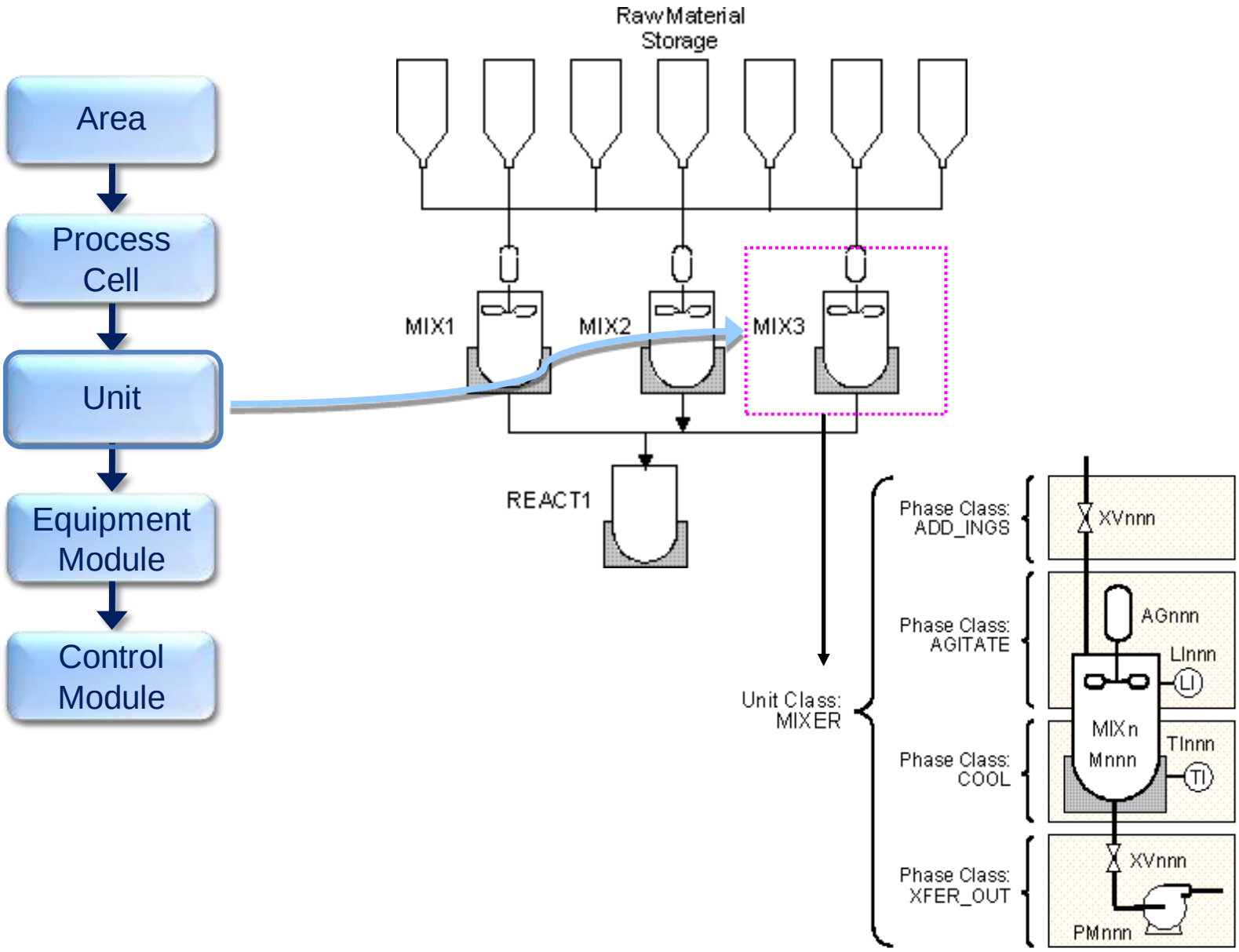
S88 Physical Model – 控制模型



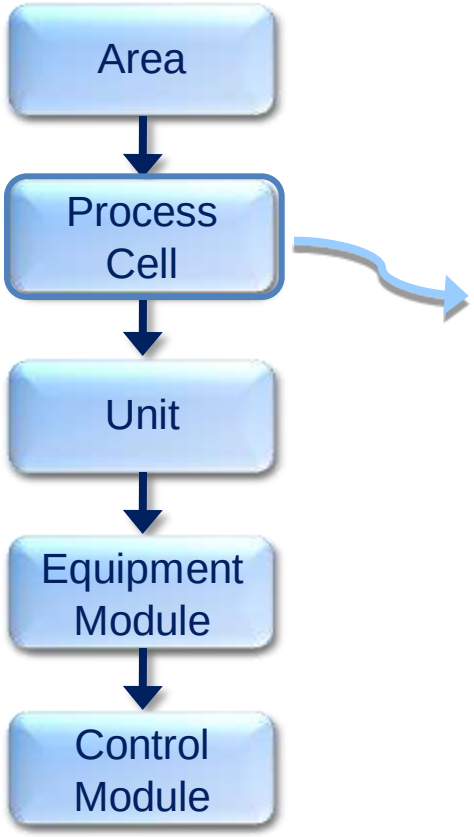
S88 Physical Model - 设备模型

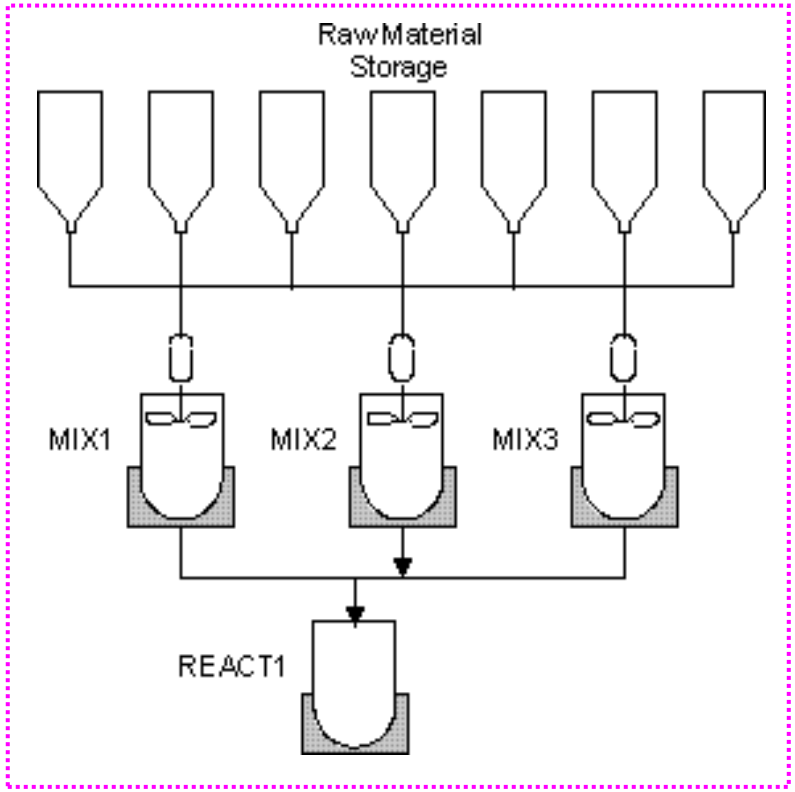


S88 Physical Model – 单元装置模型

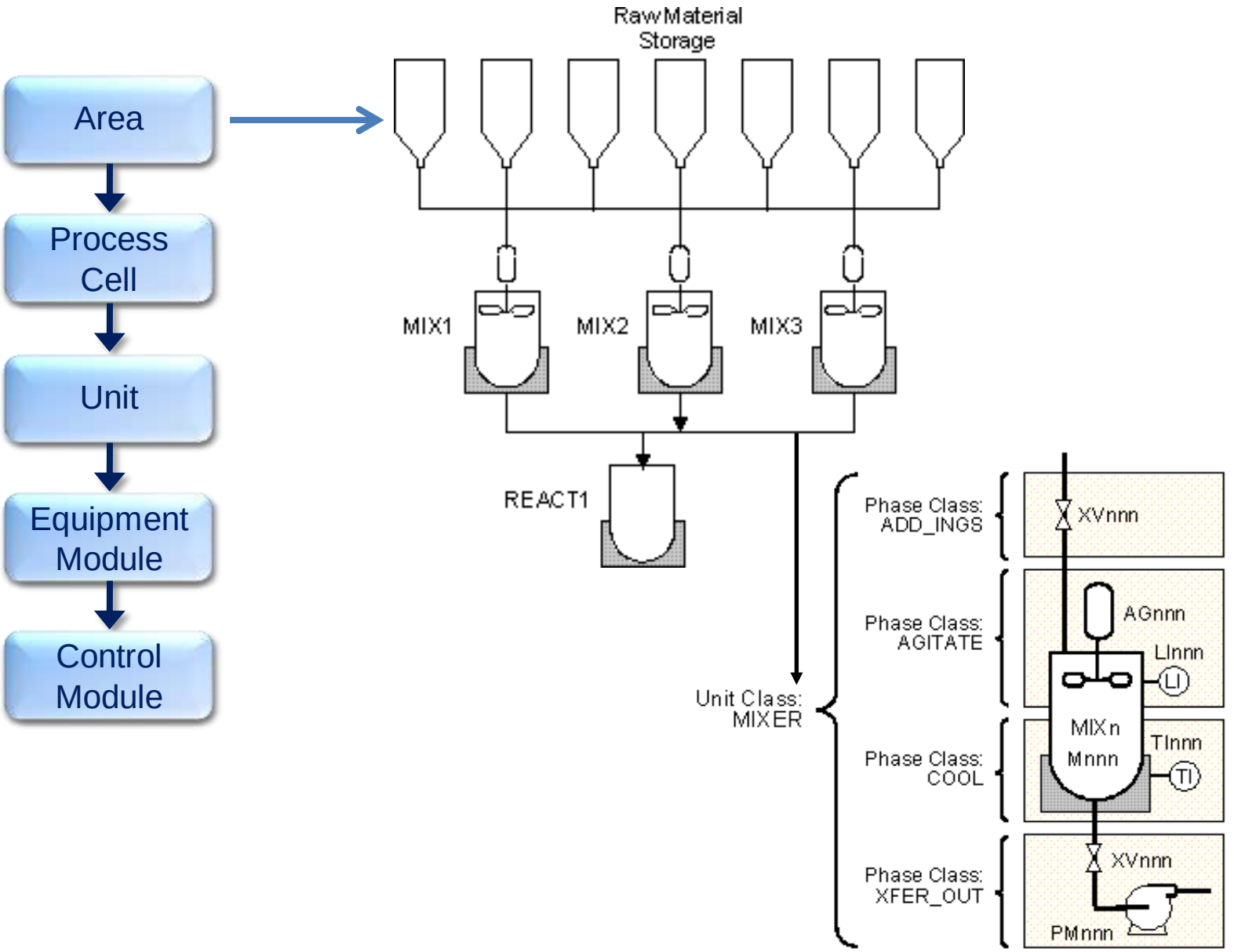


S88 Physical Model – 工段模型

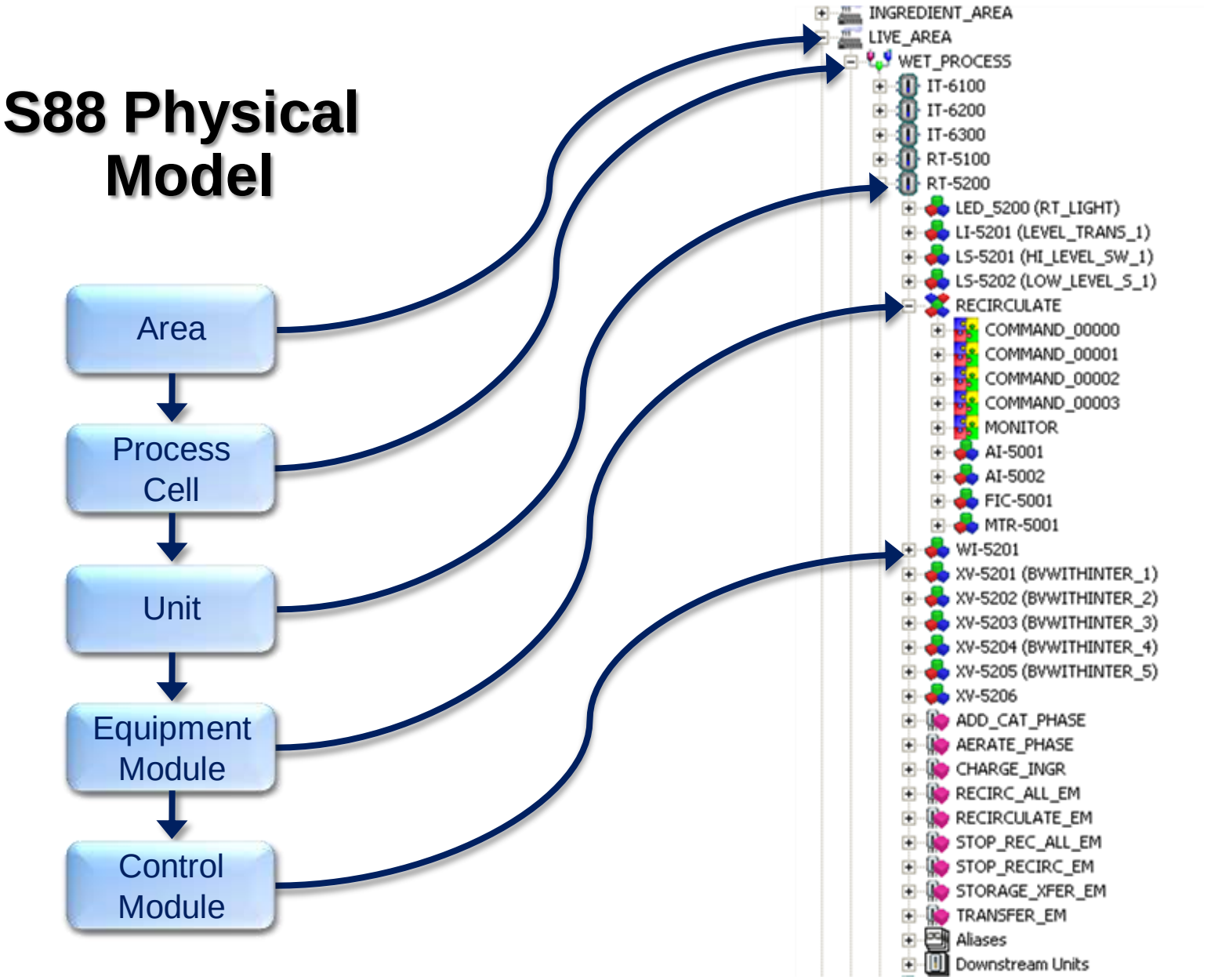




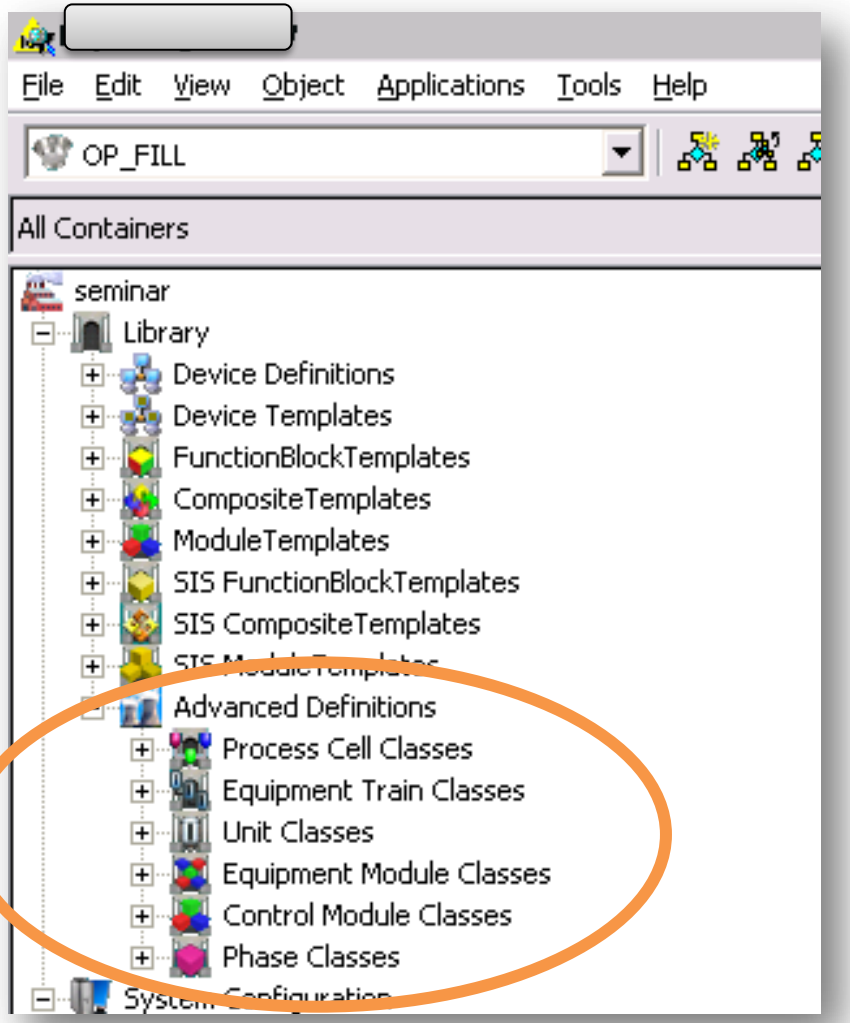
S88 Physical Model – 车间或工厂模型



S88物理模型与软件模型相互对应

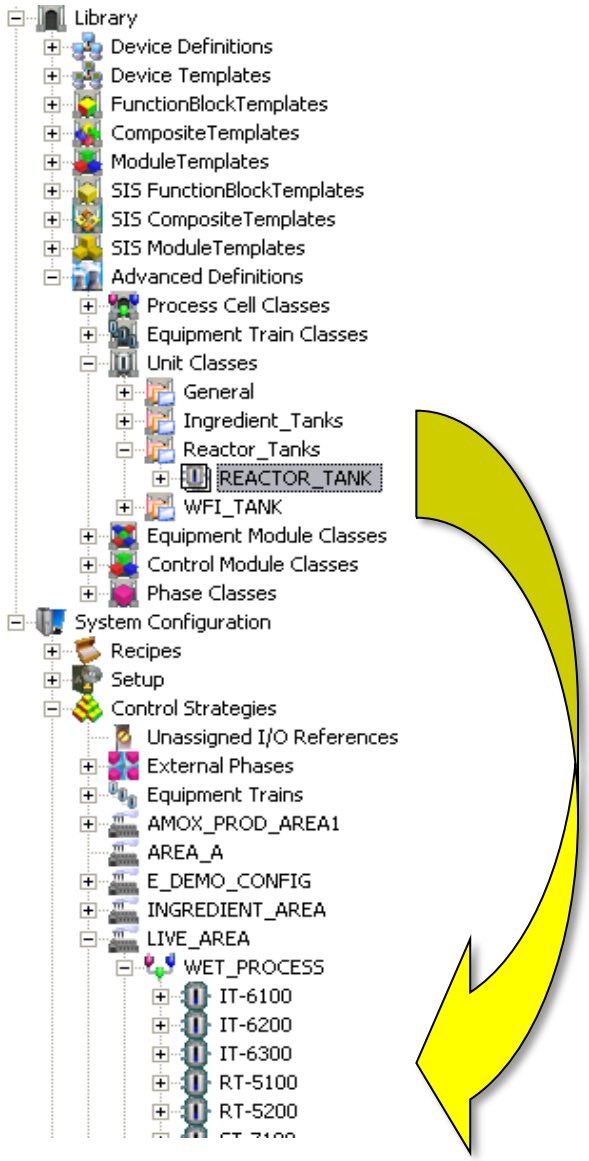


基于类（Class）的组态



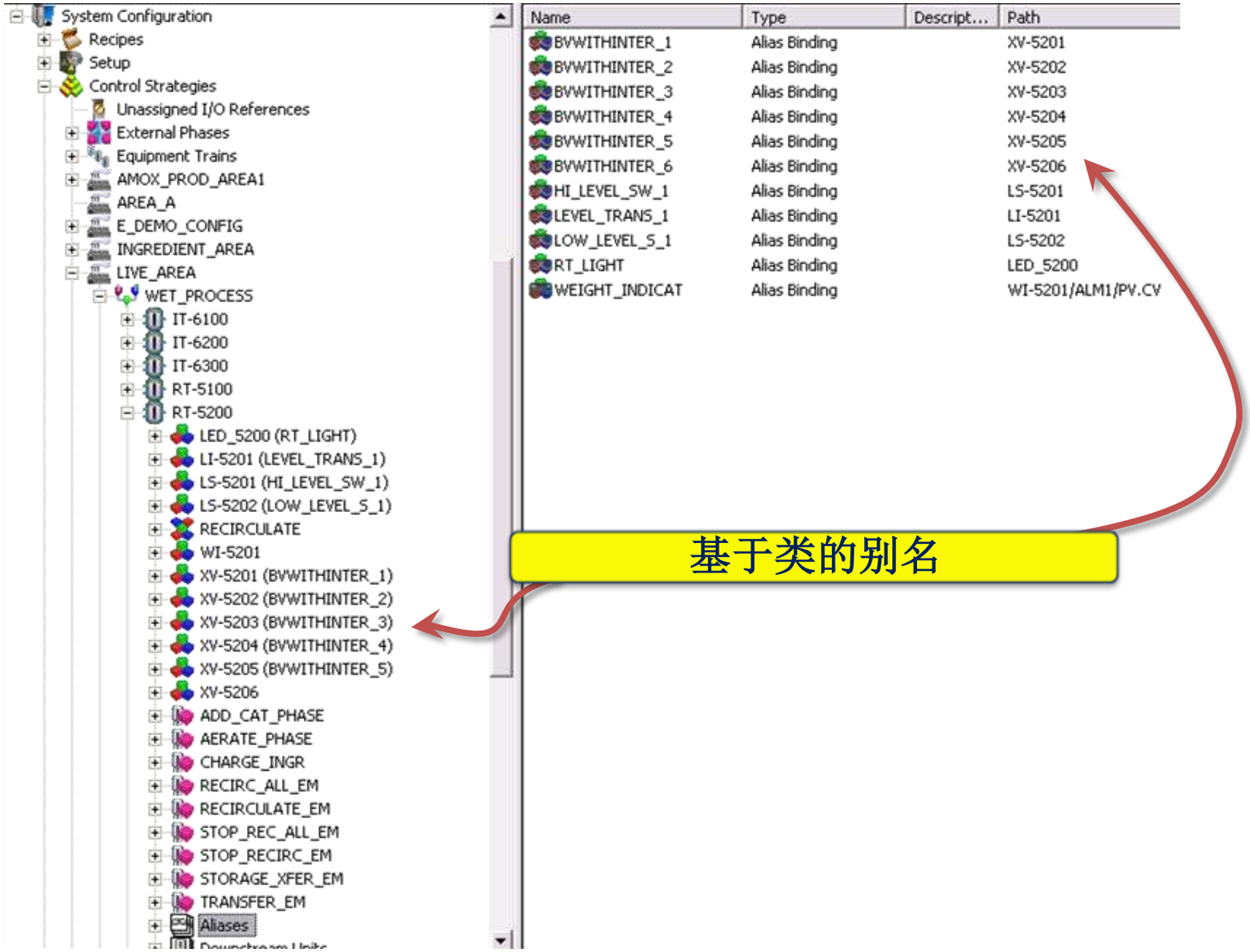
组态和测试一次，可以重复使用

从类（Class）生成实例（Instance）

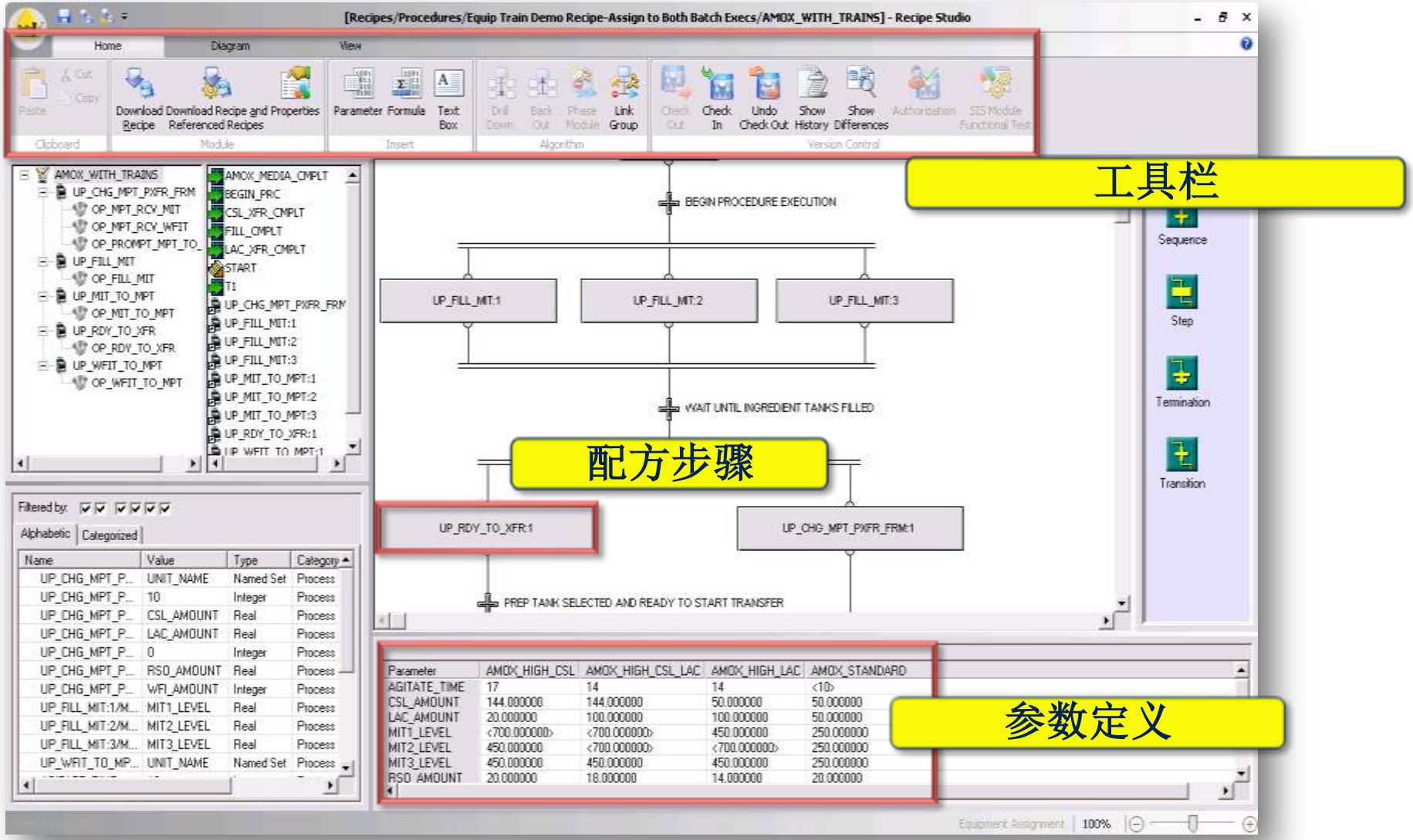


- 通过简单的拖曳把一个类生成多个实例
- 实例的参数、特性等都继承于类
- 只需对类做修改，相应实例自动变更

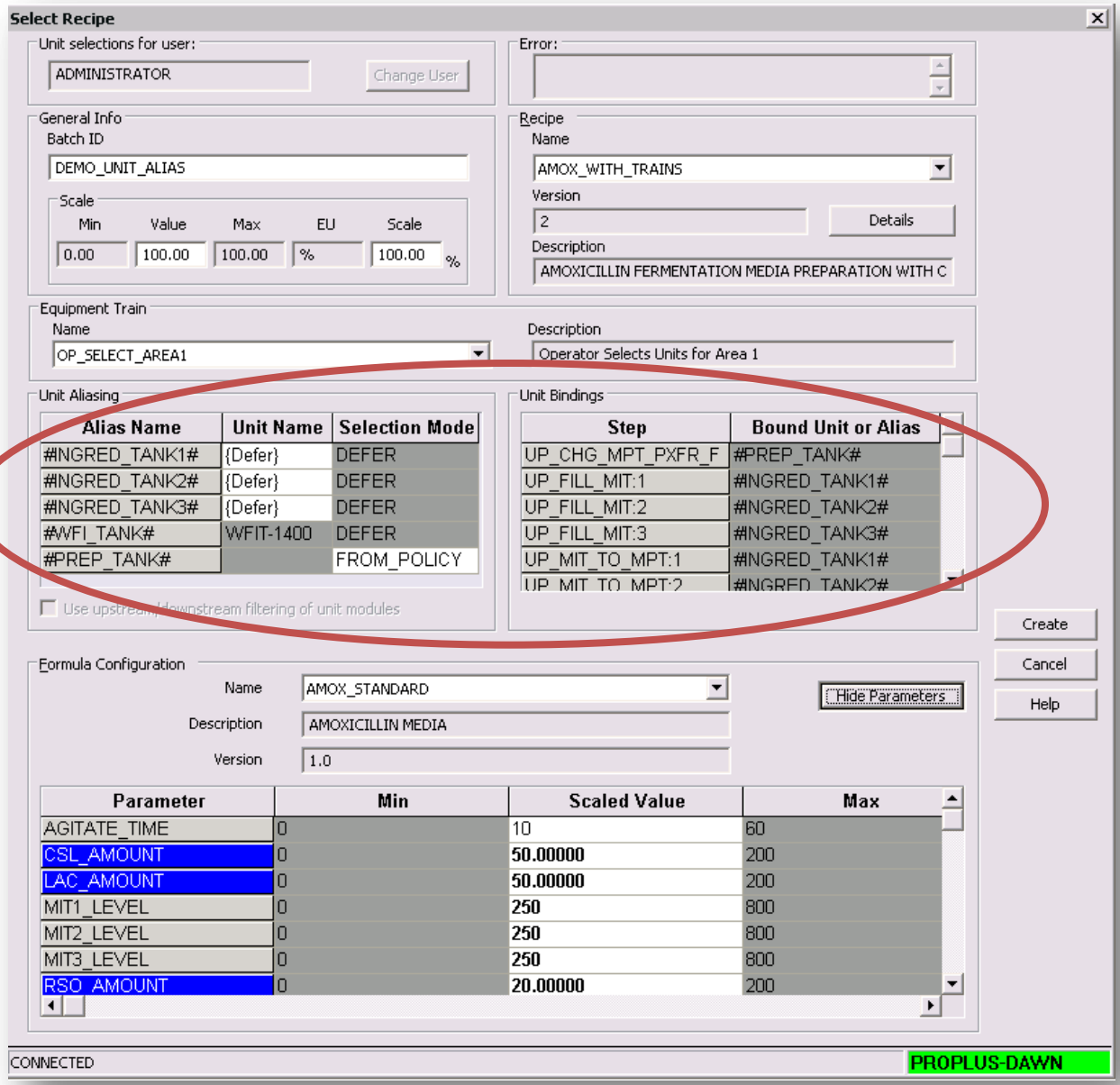
关于别名Alias


System Configuration
Recipes
Setup
Control Strategies
Unassigned I/O References
External Phases
Equipment Trains
AMOX_PROD_AREA1
AREA_A
E_DEMO_CONFIG
INGREDIENT_AREA
LIVE_AREA
WET_PROCESS
IT-6100
IT-6200
IT-6300
RT-5100
RT-5200
LED_5200 (RT_LIGHT)
LI-5201 (LEVEL_TRANS_1)
LS-5201 (HI_LEVEL_SW_1)
LS-5202 (LOW_LEVEL_S_1)
RECIRCULATE
WI-5201
XV-5201 (BVWITHINTER_1)
XV-5202 (BVWITHINTER_2)
XV-5203 (BVWITHINTER_3)
XV-5204 (BVWITHINTER_4)
XV-5205 (BVWITHINTER_5)
XV-5206
ADD_CAT_PHASE
AERATE_PHASE
CHARGE_INGR
RECIRC_ALL_EM
RECIRCULATE_EM
STOP_REC_ALL_EM
STOP_RECIRC_EM
STORAGE_XFER_EM
TRANSFER_EM
Aliases
Name
Type
Descript...
Path
BVWITHINTER_1 Alias Binding XV-5201
BVWITHINTER_2 Alias Binding XV-5202
BVWITHINTER_3 Alias Binding XV-5203
BVWITHINTER_4 Alias Binding XV-5204
BVWITHINTER_5 Alias Binding XV-5205
BVWITHINTER_6 Alias Binding XV-5206
HI_LEVEL_SW_1 Alias Binding LS-5201
LEVEL_TRANS_1 Alias Binding LI-5201
LOW_LEVEL_S_1 Alias Binding LS-5202
RT_LIGHT Alias Binding LED_5200
WEIGHT_INDICAT Alias Binding WI-5201/ALM1/PV.CV
基于类的别名

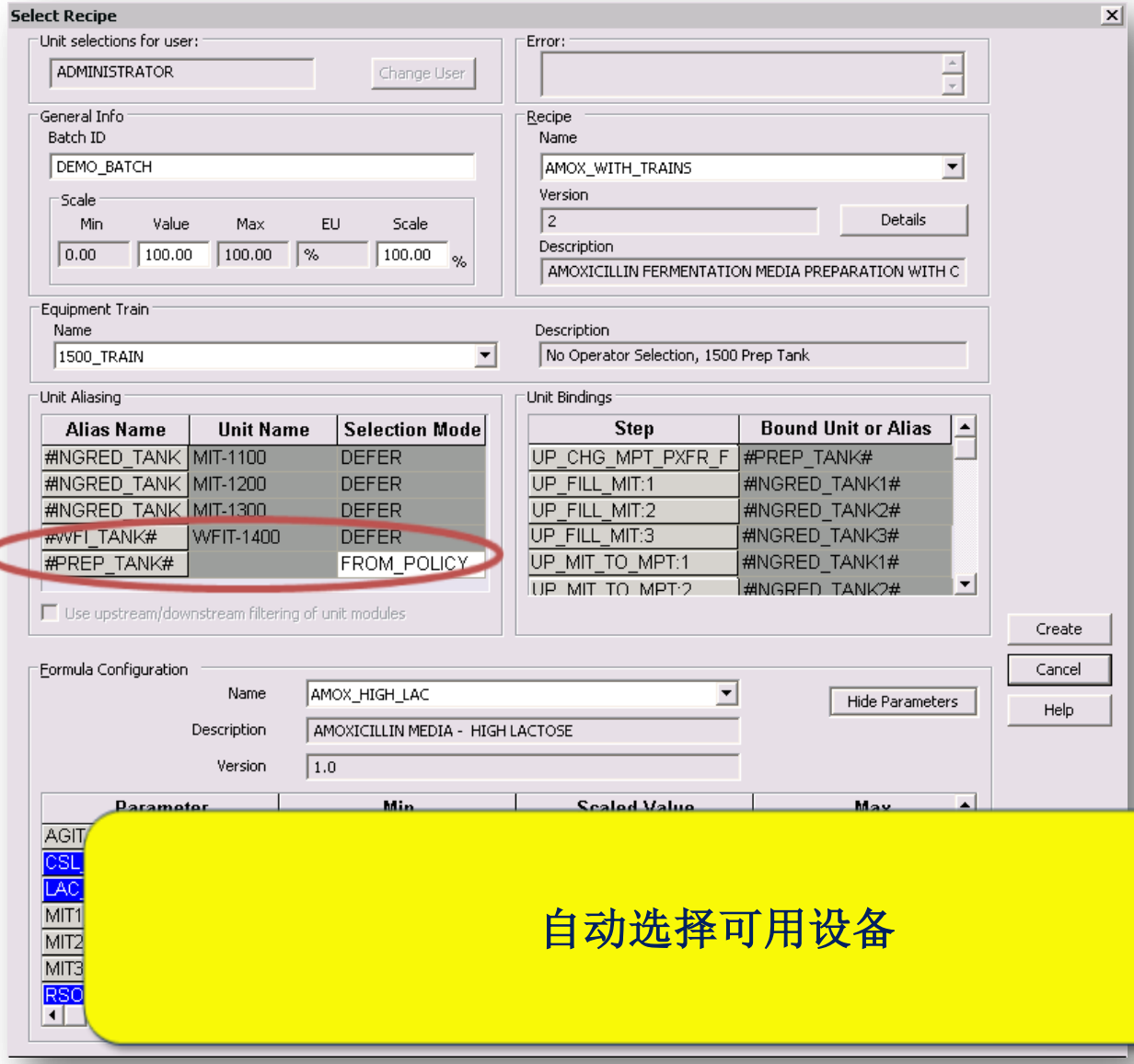
在批处理系统中建立配方



批次创建

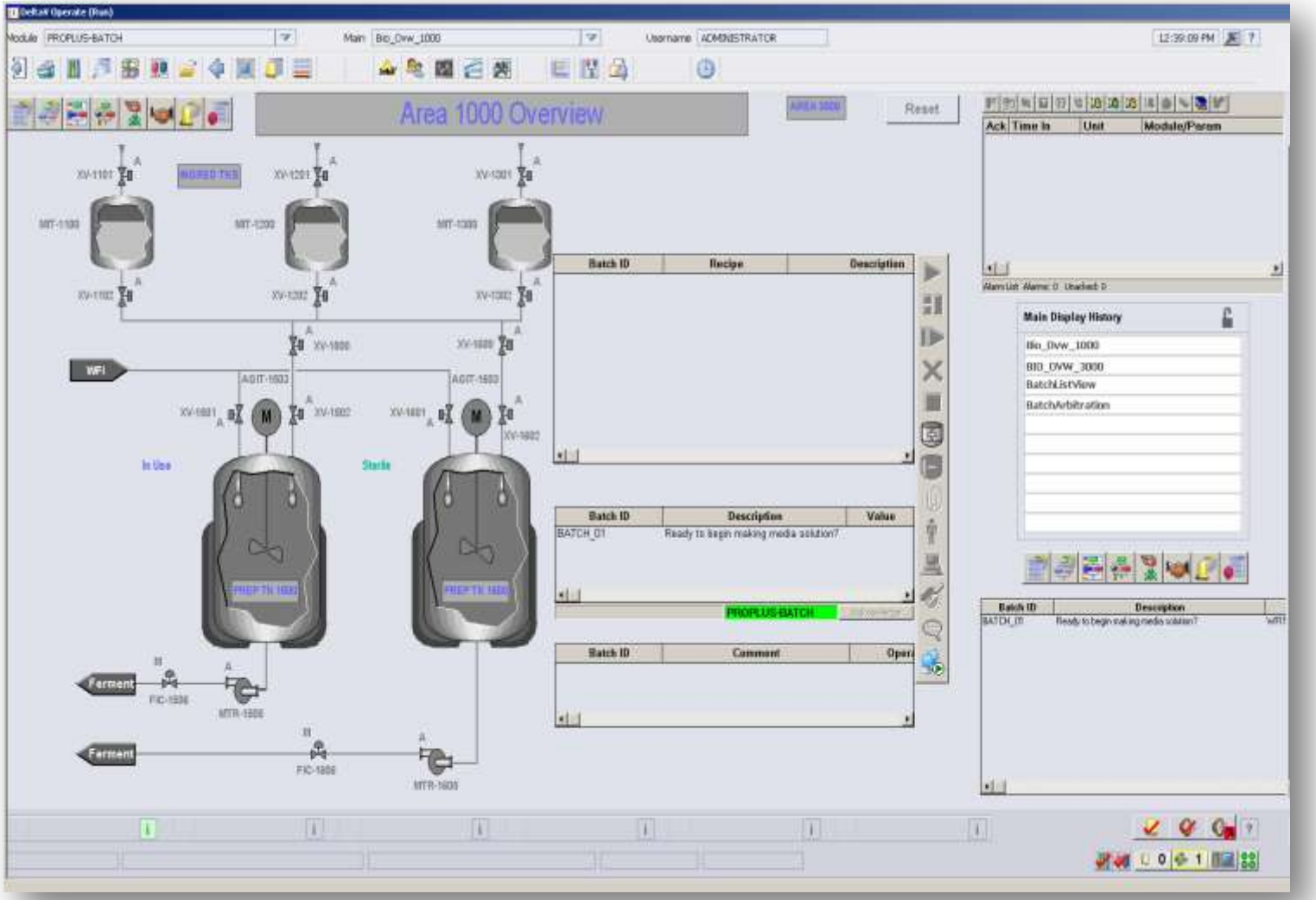

Select Recipe
Unit selections for user:
ADMINISTRATOR
Change User
Error:
General Info
Batch ID
DEMO_UNIT_ALIAS
Scale
Min
Value
Max
EU
Scale
0.00
100.00
100.00
%
100.00
%
Recipe
Name
AMOX_WITH_TRAINS
Version
2
Details
Description
AMOXICILLIN FERMENTATION MEDIA PREPARATION WITH C
Equipment Train
Name
OP_SELECT_AREA1
Description
Operator Selects Units for Area 1
Unit Aliasing
Alias Name
Unit Name
Selection Mode
#INGRED_TANK1#
{Defer}
DEFER
#INGRED_TANK2#
{Defer}
DEFER
#INGRED_TANK3#
{Defer}
DEFER
#WFI_TANK#
WFIT-1400
DEFER
#PREP_TANK#
FROM_POLICY
Use upstream/downstream filtering of unit modules
Unit Bindings
Step
Bound Unit or Alias
UP_CHG_MPT_PXFR_F
#PREP_TANK#
UP_FILL_MIT:1
#INGRED_TANK1#
UP_FILL_MIT:2
#INGRED_TANK2#
UP_FILL_MIT:3
#INGRED_TANK3#
UP_MIT_TO_MPT:1
#INGRED_TANK1#
Create
Cancel
Help
Formula Configuration
Name
AMOX_STANDARD
Hide Parameters
Description
AMOXICILLIN MEDIA
Version
1.0
Parameter
Min
Scaled Value
Max
AGITATE_TIME
0
10
60
CSL_AMOUNT
0
50.00000
200
LAC_AMOUNT
0
50.00000
200
MIT1_LEVEL
0
250
800
MIT2_LEVEL
0
250
800
MIT3_LEVEL
0
250
800
RSO_AMOUNT
0
20.00000
200
CONNECTED
PROPLUS-DAWN

自动的单元设备批次执行



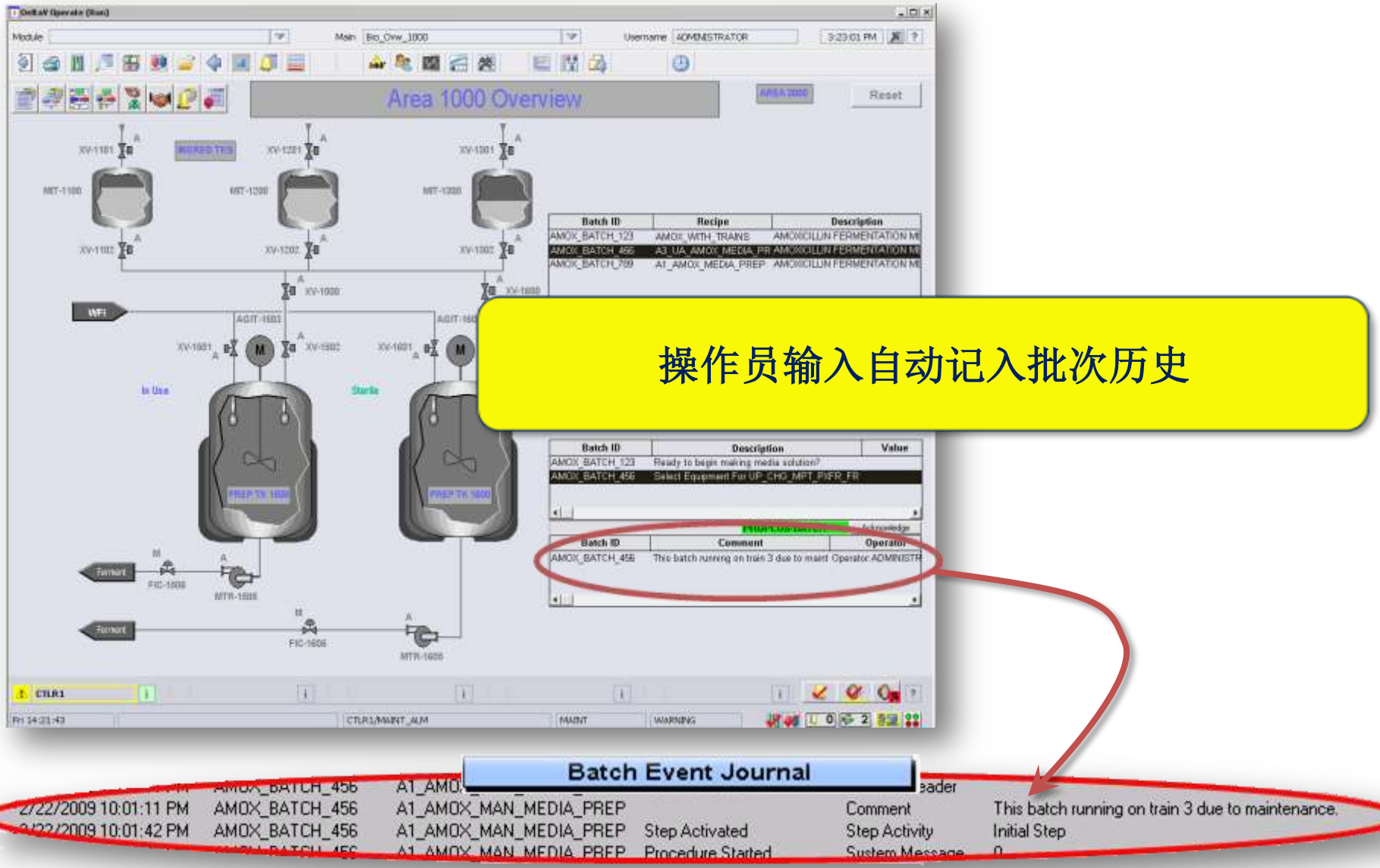
自动选择可用设备

监视批次执行

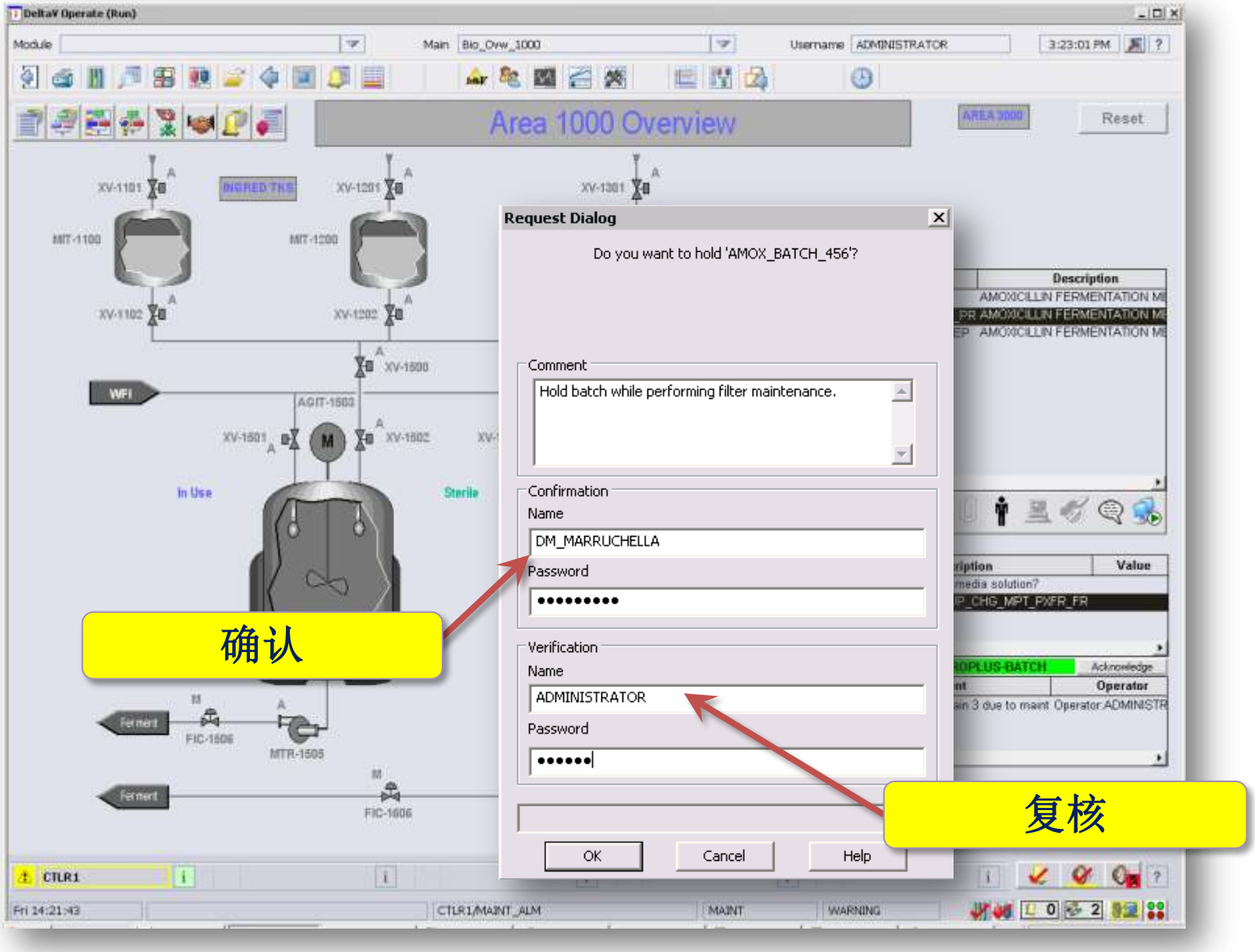


统一画面，一目了然

电子操作日志


Area 1000 Overview
Reset
Batch ID
Recipe
Description
AMOX_BATCH_123
AMOX_WITH_TRAINS
AMOX_BATCH_456
A3_UA_AMOX_MEDIA_PR
AMOX_BATCH_789
A1_AMOX_MEDIA_PREP
操作员输入自动记入批次历史
Batch ID
Description
Value
AMOX_BATCH_123
Ready to begin making media solution?
AMOX_BATCH_456
Batch ID
Comment
Operator
AMOX_BATCH_456
This batch running on train 3 due to maint
Operator ADMINISTR
Batch Event Journal
2/22/2009 10:01:11 PM
AMOX_BATCH_456
A1_AMOX_MAN_MEDIA_PREP
Comment
This batch running on train 3 due to maintenance.
2/22/2009 10:01:42 PM
AMOX_BATCH_456
A1_AMOX_MAN_MEDIA_PREP
Step Activated
Step Activity
Initial Step
Procedure Started
System Message
0

确认和复核

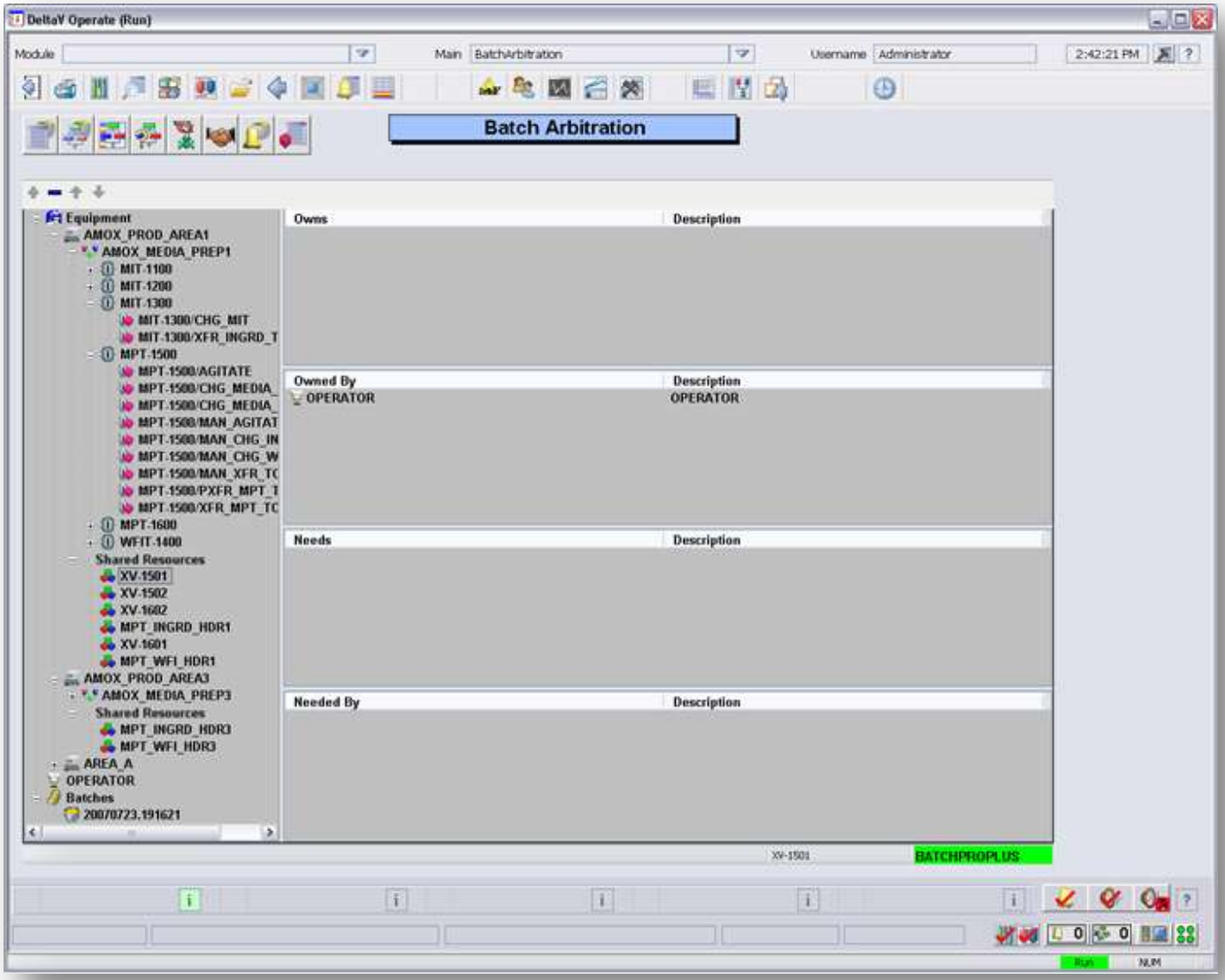

DeltaV Operate (Run)
Module
Main
Bio_Ovw_1000
Username
ADMINISTRATOR
3:23:01 PM
Area 1000 Overview
AREA 3000
Reset
Request Dialog
Do you want to hold 'AMOX_BATCH_456'?
Comment
Hold batch while performing filter maintenance.
Confirmation
Name
DM_MARRUCHELLA
Password
Verification
Name
ADMINISTRATOR
Password
OK
Cancel
Help
确认
复核
Description
Value
Operator
WFI
In Use
Sterile
CTLR1
CTLR1/MAINT_ALM
MAINT
WARNING

在批次执行中更换设备

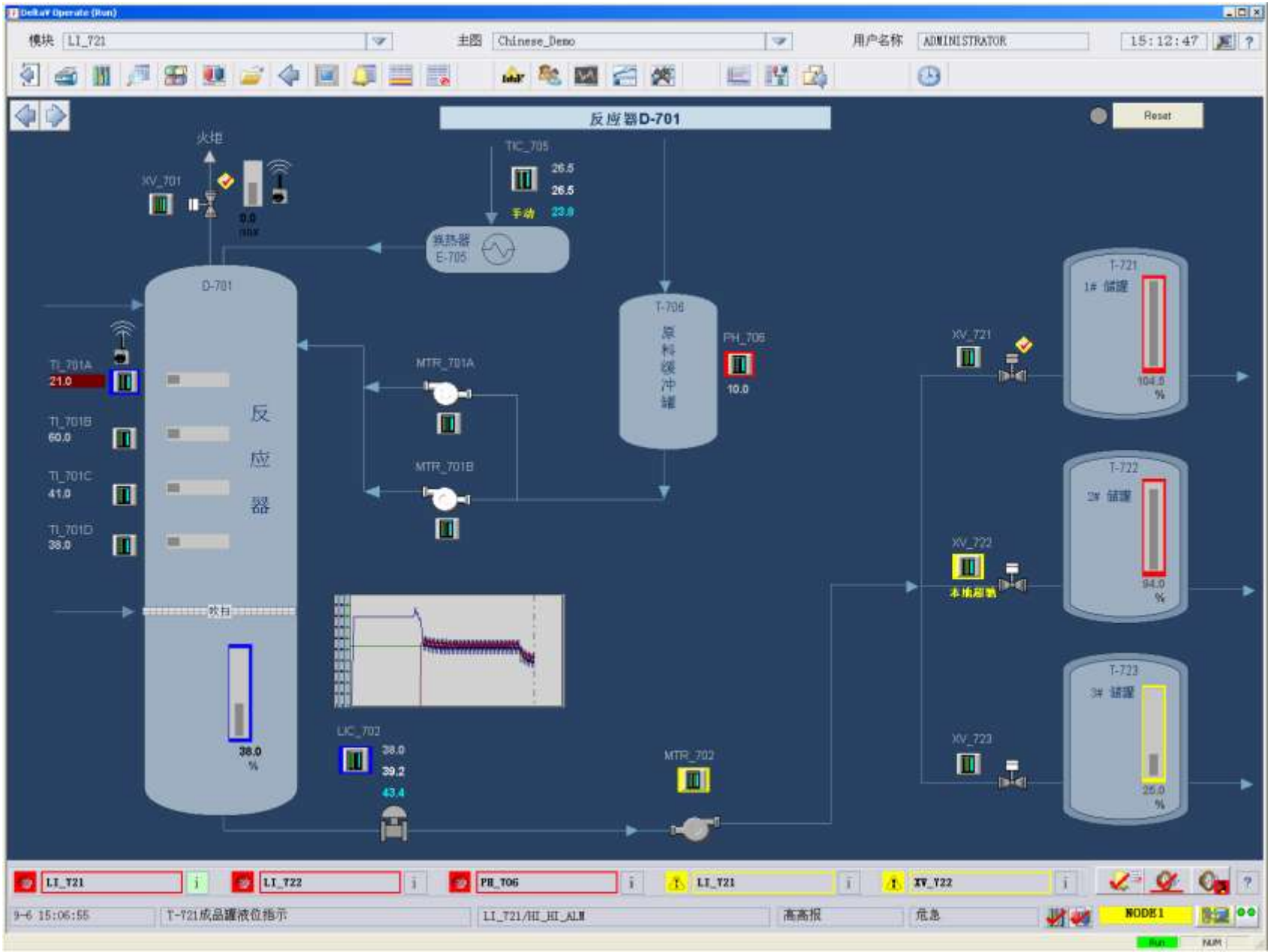
Increased operational flexibility!

- “Rebind Units” gives operators the agility to switch units right down to the last minute – even if the batch is already running
- Minimize downtime and keep batches running when unforeseen circumstances arise in the plant
- Easy to correct invalid operator equipment selections

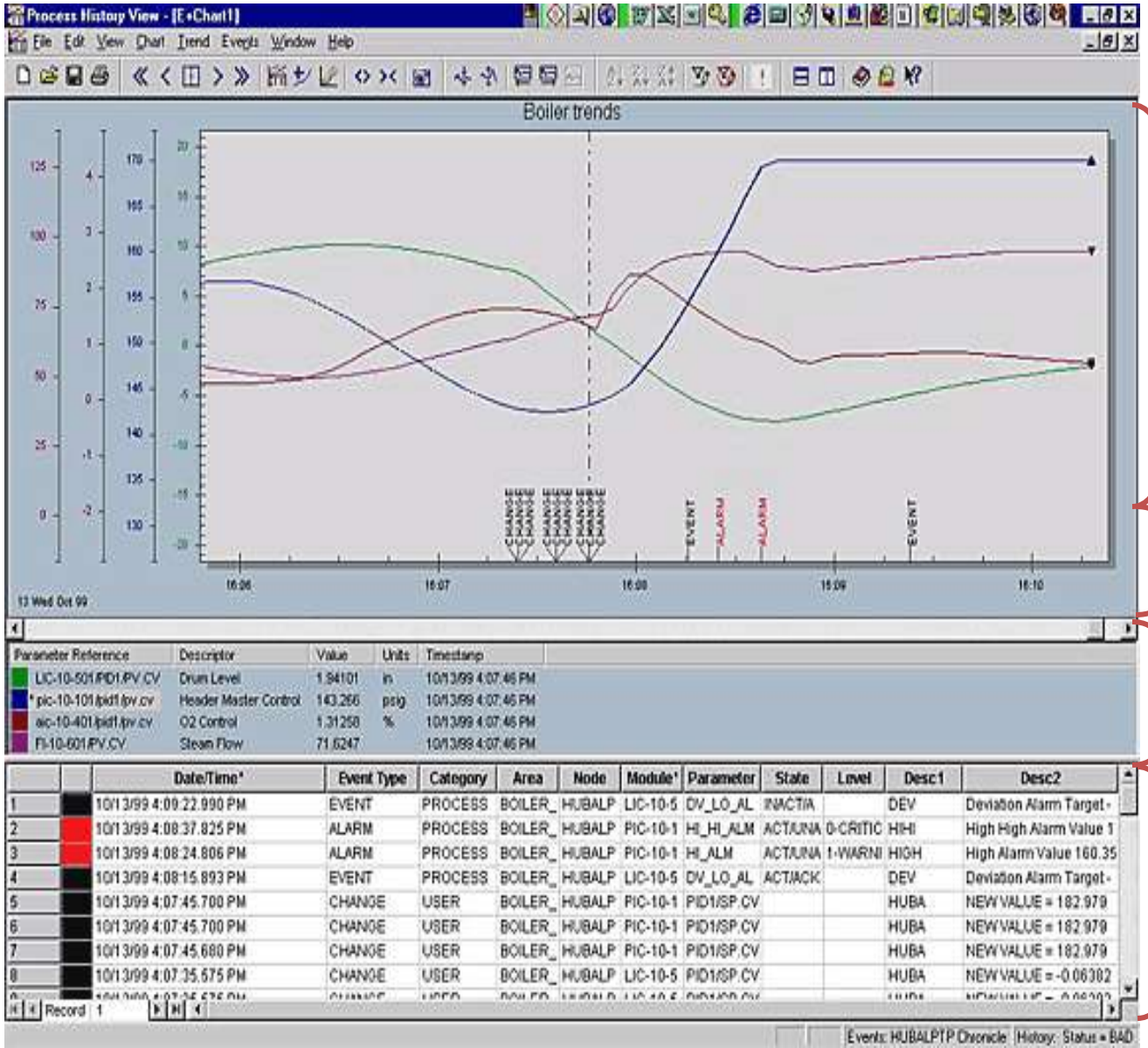
设备仲裁和调度


DeltaV Operate (Run)
Module
Main BatchArbitration
Username Administrator
2:42:21 PM
Batch Arbitration
Equipment
AMOX_PROD_AREA1
AMOX_MEDIA_PREP1
MIT-1100
MIT-1200
MIT-1300
MIT-1300/CHG_MIT
MIT-1300/XFR_INGRD_T
MPT-1500
MPT-1500/AGITATE
MPT-1500/CHG_MEDIA_
MPT-1500/CHG_MEDIA_
MPT-1500/MAN_AGITAT
MPT-1500/MAN_CHG_IN
MPT-1500/MAN_CHG_W
MPT-1500/MAN_XFR_TC
MPT-1500/PXFR_MPT_T
MPT-1500/XFR_MPT_TC
MPT-1600
WFIT-1400
Shared Resources
XV-1501
XV-1502
XV-1602
MPT_INGRD_HDR1
XV-1601
MPT_WFI_HDR1
AMOX_PROD_AREA3
AMOX_MEDIA_PREP3
Shared Resources
MPT_INGRD_HDR3
MPT_WFI_HDR3
AREA_A
OPERATOR
Batches
20070723.191621
Owns
Description
Owned By
Description
OPERATOR
OPERATOR
Needs
Description
Needed By
Description
XV-1501
BATCHPROPLUS
Run
NUM

报警管理


模块 LI_721
主图 Chinese_Demo
用户名称 ADMINISTRATOR
15:12:47
反应器D-701
Reset
火炬
XV_701
TIC_705
26.5
26.5
手动 23.9
换热器 E-705
D-701
反应器
T-706
原料缓冲罐
PH_706
10.0
TI_701A 21.0
TI_701B 60.0
TI_701C 41.0
TI_701D 38.0
MTR_701A
MTR_701B
LIC_702
38.0
39.2
43.4
38.0 %
MTR_702
XV_721
XV_722
XV_723
本地超驰
T-721 1# 储罐
104.0 %
T-722 2# 储罐
94.0 %
T-723 3# 储罐
25.0 %
LI_721
LI_722
PH_706
LI_721
XV_722
9-6 15:06:55
T-721成品罐液位指示
LI_721/HI_HI_ALM
高高报
危急
NODE1

与历史记录相整合的事件记录



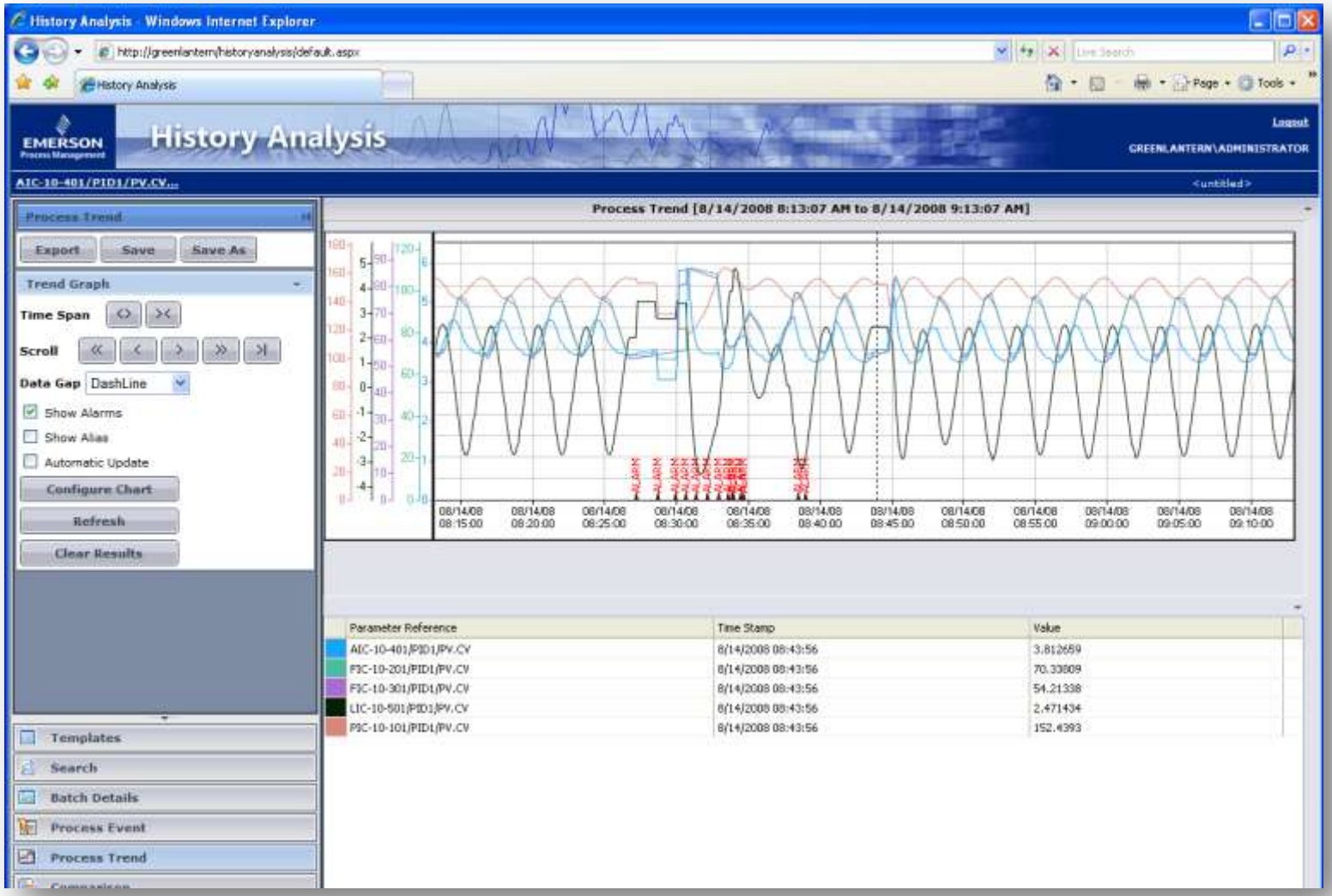
趋势

事件记录

实时数据

详细记录

批次历史趋势


History Analysis - Windows Internet Explorer
http://greenlantern/historyanalysis/default.aspx
History Analysis
EMERSON
Process Management
History Analysis
Logout
GREENLANTERN\ADMINISTRATOR
AIC-10-401/PID1/PV.CV...
<untitled>
Process Trend
Export
Save
Save As
Trend Graph
Time Span
Scroll
Data Gap
DashLine
Show Alarms
Show Alias
Automatic Update
Configure Chart
Refresh
Clear Results
Templates
Search
Batch Details
Process Event
Process Trend
Process Trend [8/14/2008 8:13:07 AM to 8/14/2008 9:13:07 AM]
08/14/08 08:15:00
08/14/08 08:20:00
08/14/08 08:25:00
08/14/08 08:30:00
08/14/08 08:35:00
08/14/08 08:40:00
08/14/08 08:45:00
08/14/08 08:50:00
08/14/08 08:55:00
08/14/08 09:00:00
08/14/08 09:05:00
08/14/08 09:10:00
Parameter Reference
Time Stamp
Value
AIC-10-401/PID1/PV.CV
8/14/2008 08:43:56
3.812659
FIC-10-201/PID1/PV.CV
8/14/2008 08:43:56
70.33809
FIC-10-301/PID1/PV.CV
8/14/2008 08:43:56
54.21338
LIC-10-501/PID1/PV.CV
8/14/2008 08:43:56
2.471434
PIC-10-101/PID1/PV.CV
8/14/2008 08:43:56
152.4393

底层设备接口统计---示例

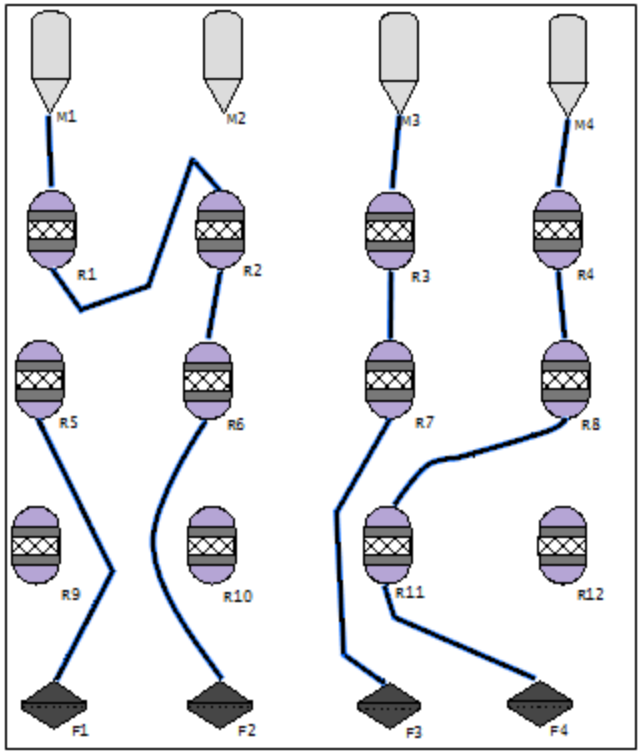
序号	线别/设备	控制方式	硬件型号	硬件品牌	软件描述
1	PCII整瓶机	PLC+触摸屏	1747-L542	*******	有源程序
2	PCII充填机	工业电脑+PROFIBUS	PROFIBUS WAGO 750-333	*******	无源程序

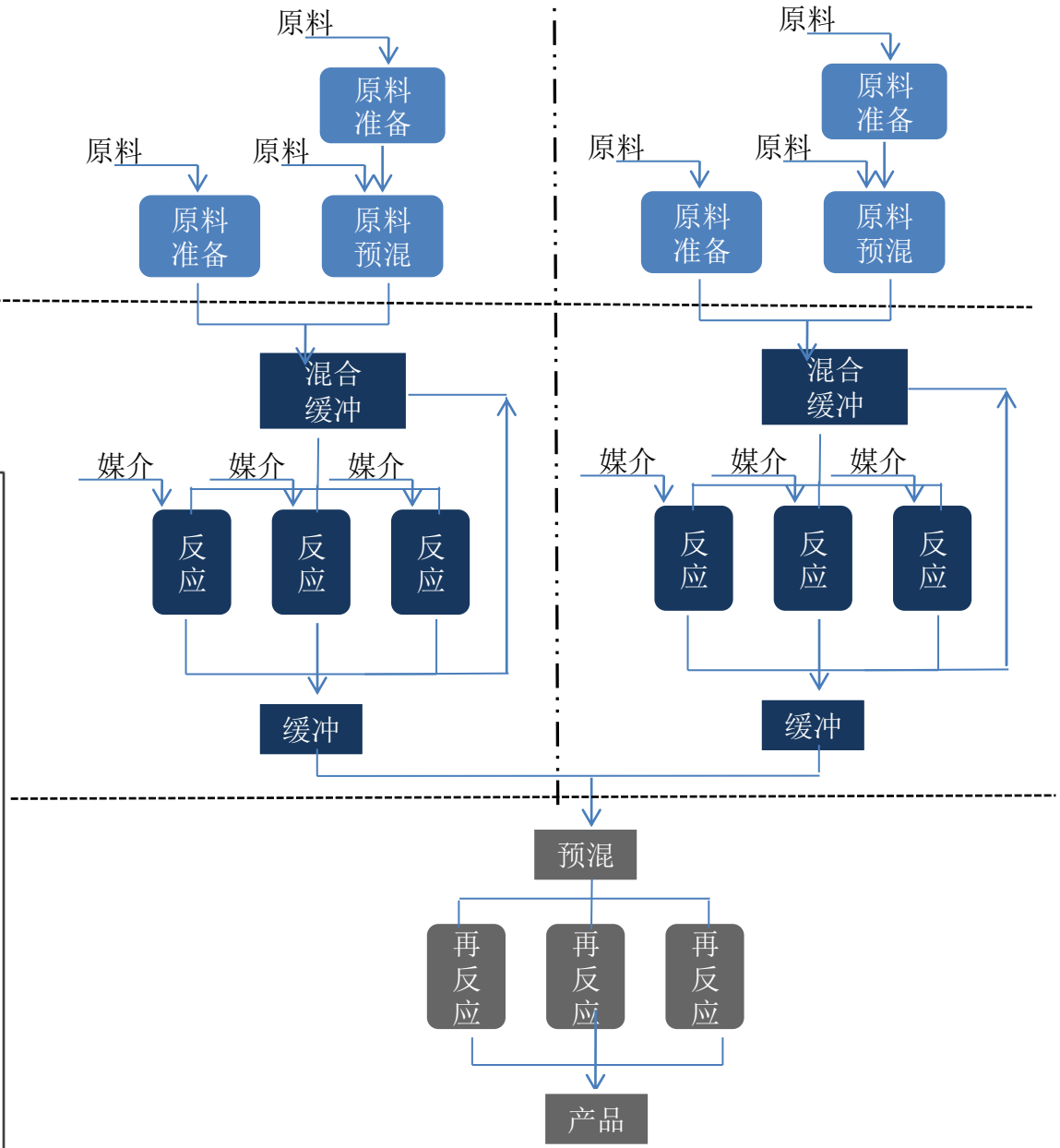
通信接口类型	接口数量	占用接口	空闲接口	可扩展I/O槽	硬件厂家联系方式	数据采集
串口/PROG.TERM	1	串口	PROG.TERM	√	******	①出口计数 ②开、停机时间 ③故障信息 ④在线运行监控 ⑤维护状态提醒 ⑥气压保护监控
串口	1	串口	无	√	******	①固定期间充填量数据保存 ②班次运行状态报告，包括始终时间、过程能力等 ③开、停机时间 ④在线运行监控 ⑤故障信息 ⑥维护状态提醒 ⑦气压保护监控 ⑧异常排除信息

基于设备/流程为导向的方法

- 流程为导向
  - 在同一个UNIT中同时只有一个Phase运行
  - Phases 完全控制现场设备
  - Equipment modules 是可选的
  - 当有新产品时需要建立新的Phase
  - 对于固定产品、完全连续的工厂较为适合
- 设备为导向
  - 同一个单元有多个Phase同时运行
  - Phase 的运行为并行的
  - Equipment modules 完全控制现场设备
  - Equipment modules 是强制的
  - 新产品无需建立新的Phase
  - 适合多产品/多用途、相对离散的工厂

典型的批量控制工艺流程





S88批处理的效益

- 提高了灵活性；
- 提高了生产率；
- 提高了设备产能；
- 提高了过程质量；
- 提高了生产数量；
- 减少了操作员的操作；
- 提高了功能规范的一致性；
- 增强了设备、用户、咨询、系统集成商的信息
- 沟通；
- 不同供应商的集成变得容易；
- 缩短了产品进入市场的时间；