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ERP – PMS – PCS

- **ERP (SAP)**
  Enterprise Resource Planning
- **PMS (MES, PIMS, Batch)**
  Production Management System
- **PCS (DCS and PLC)**
  Process Control System

Peter Geurts - Stefan Jensen

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Challenge I: Wide Product/Process Range

Emulsifiers
- Distilled monoglycerides
- Mono and diglycerides
- Esters
- BENEFAT®

Textural Ingredients
- Pectin
- Carrageenan
- Alginate
- Locust bean gum (LBG)

Functional Systems
- Integrated emulsifiers and stabilisers
- Encapsulated ingredients
- Dry blends of emulsifiers and stabilisers
- Blends of stabilisers

Specialities
- Cultures
- Enzymes
- Food safety
  - Antimicrobials
  - Antioxidants
  - Protective cultures

Flavours
- Fruit flavours
- Savoury flavours
- Essences, extracts and oleoresins
- Fragrance raw material

Sweeteners
- Xylitol
- Litesse® (polydextrose)
- Fructose
- Lactitol
- D-xylose
- Rare sugars

Sugar
- Industry
- Trade
- Animal feed
- Dansukker
- Fibrex
- HP-Massa
- MARIBO/Seed

Animal Nutrition
- Betaine
- Enzymes
- Flavours

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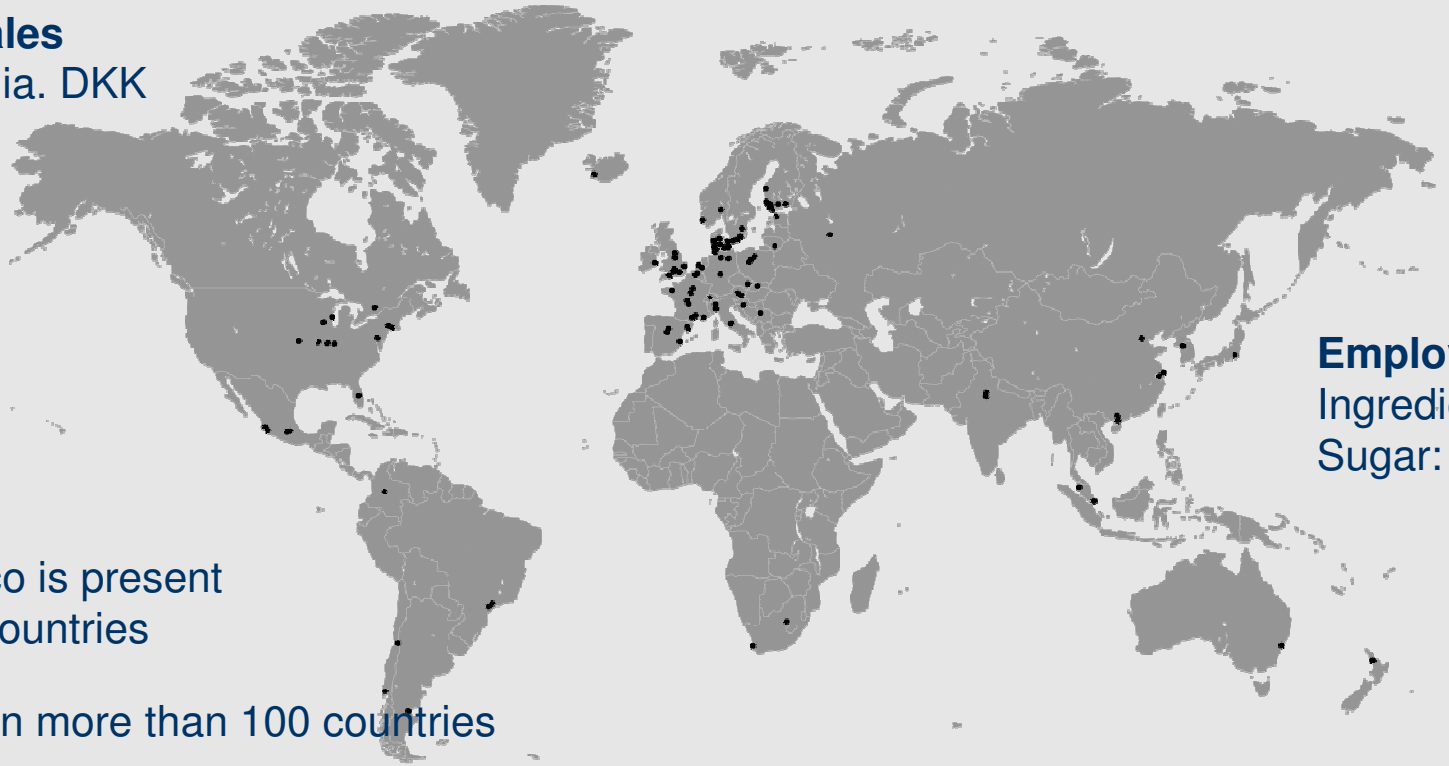
Challenge II: Global Company

Net Sales
16,6 mia. DKK



Employees
Ingredients: 5.000
Sugar: 3.000

Danisco is present
in 40 countries

Sales in more than 100 countries

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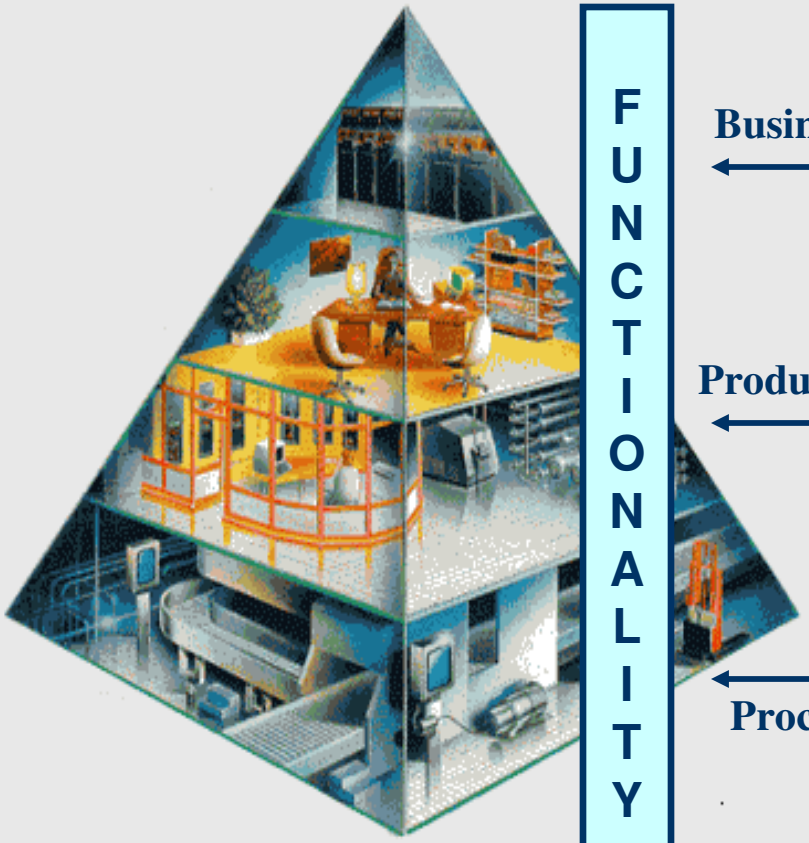
Best Practice



FUNCTIONALITY

Business ⟷ Enterprise Resource Planning

Production ⟷ Production Management (PMS / MES)

Process ⟷ Process Control (DCS / PLC)

Initiator

Enabler

TECHNOLOGY

Best Practice at all Levels

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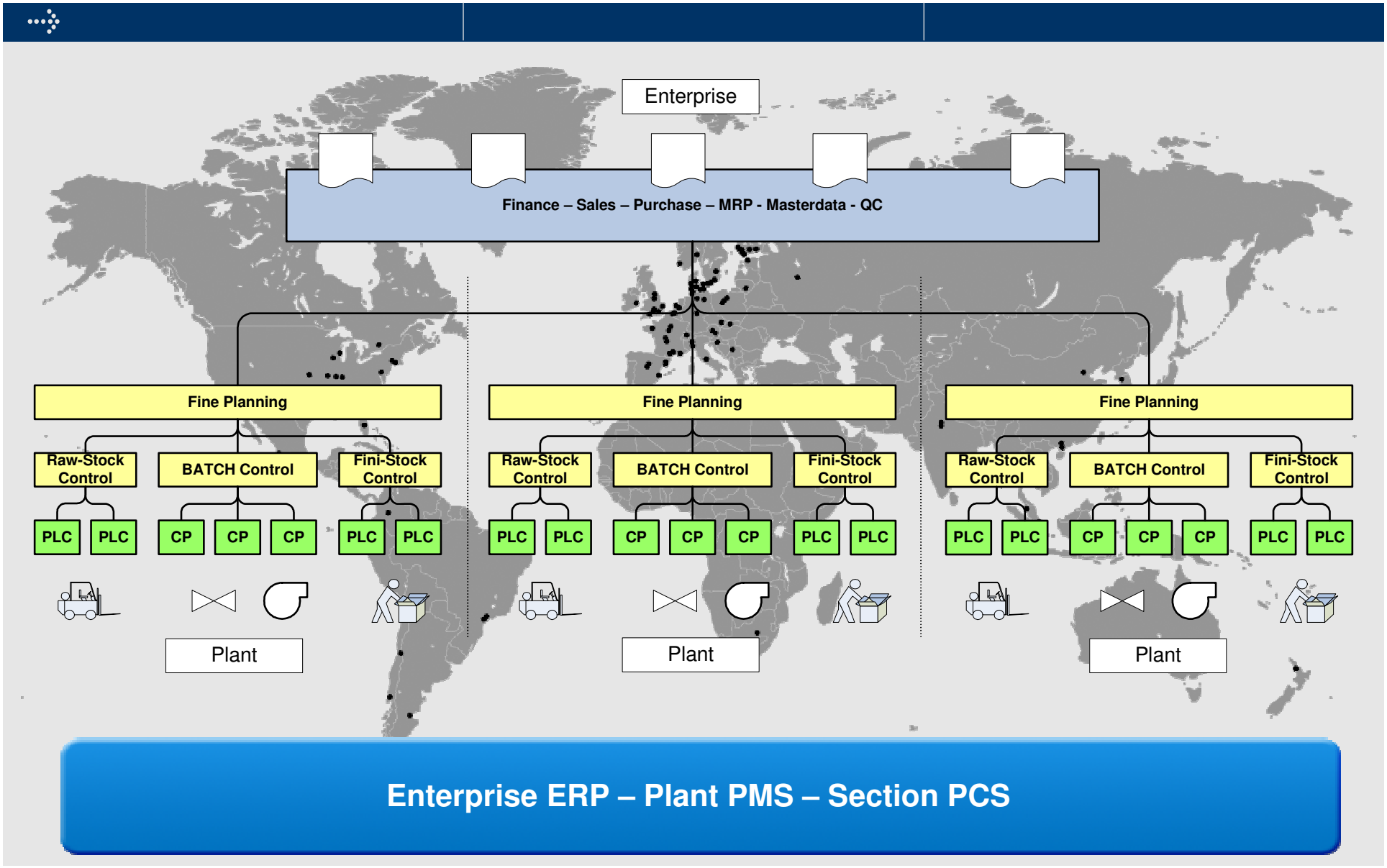
Overall Concept



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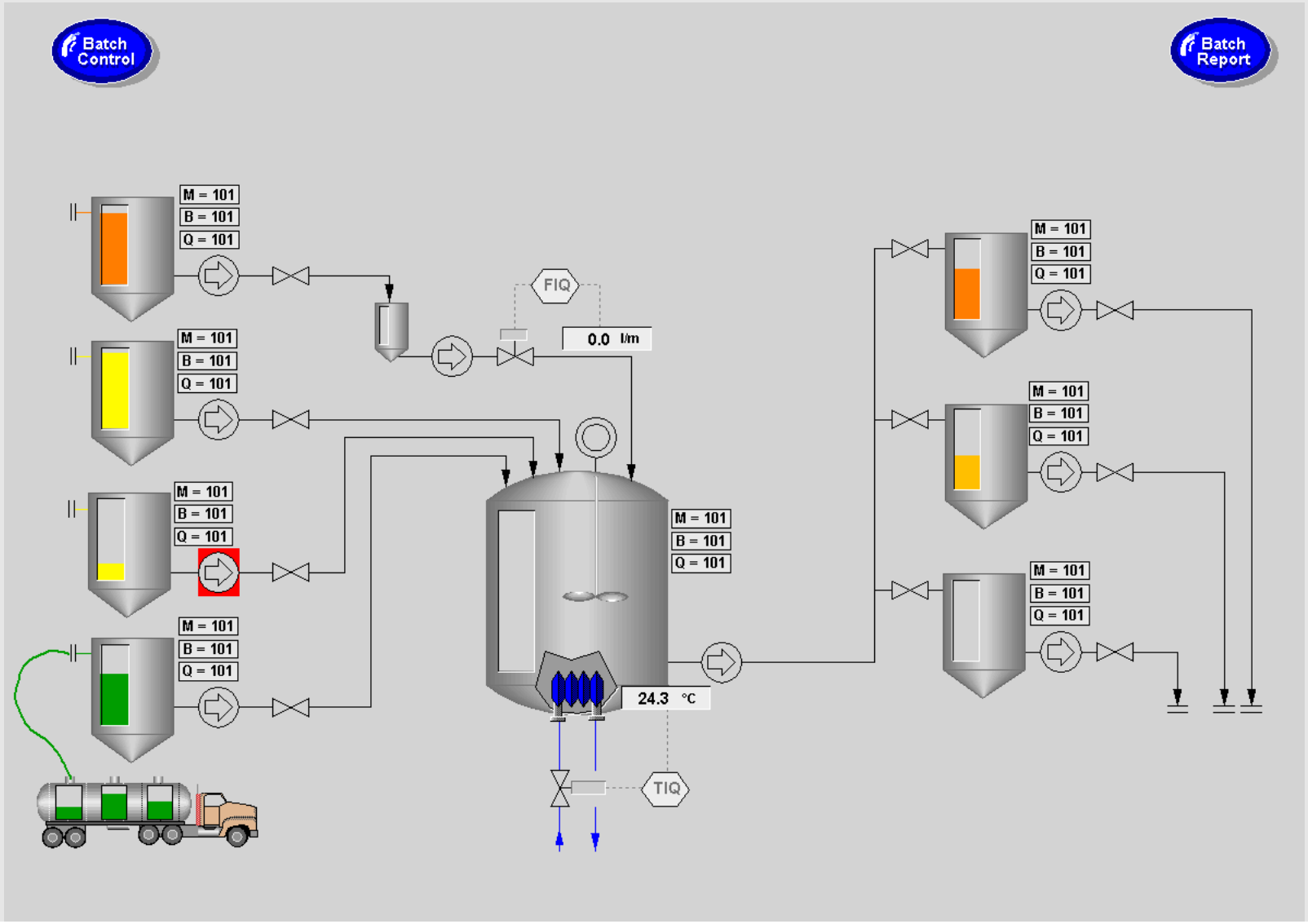
Production I



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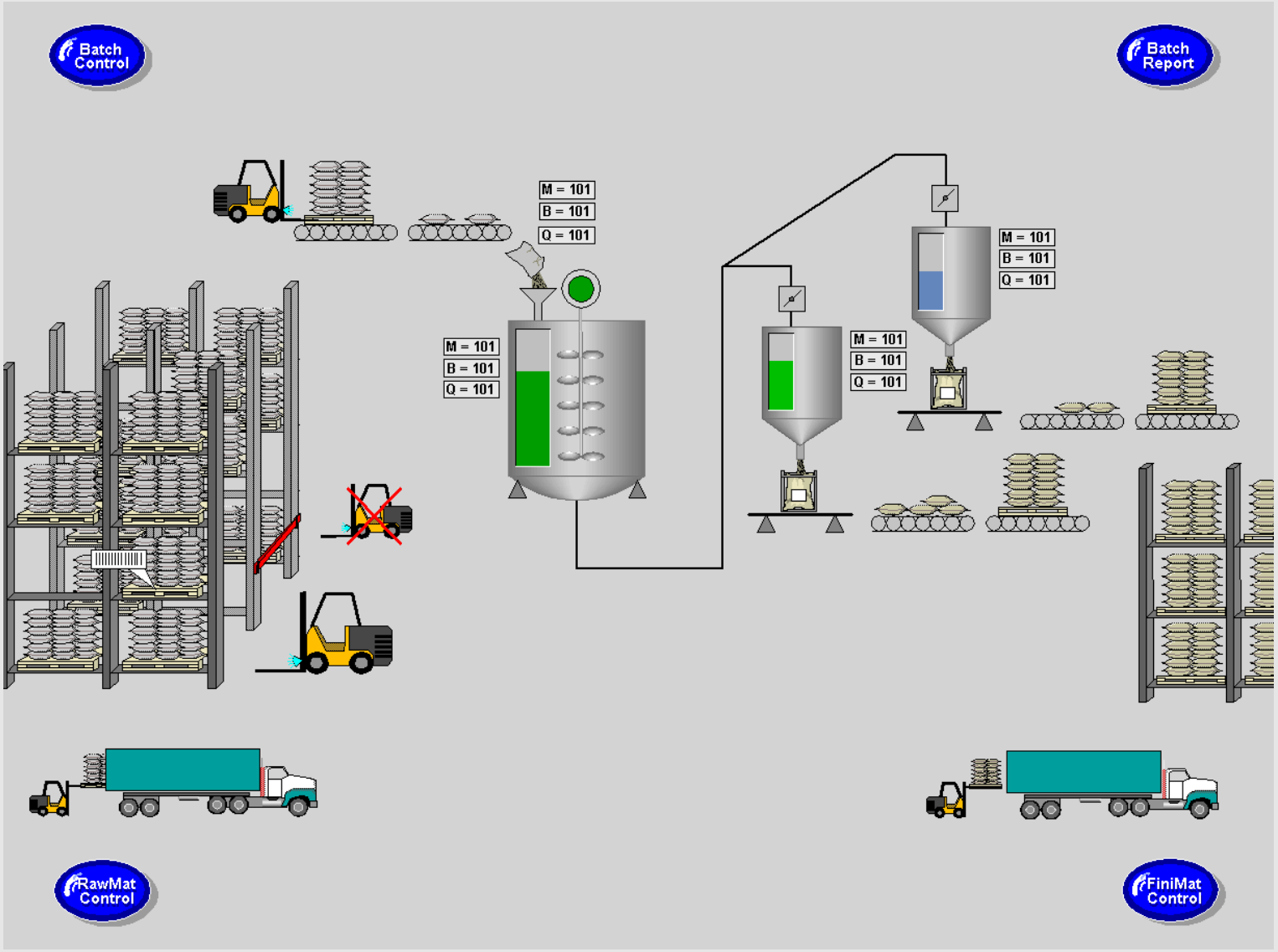
Production II



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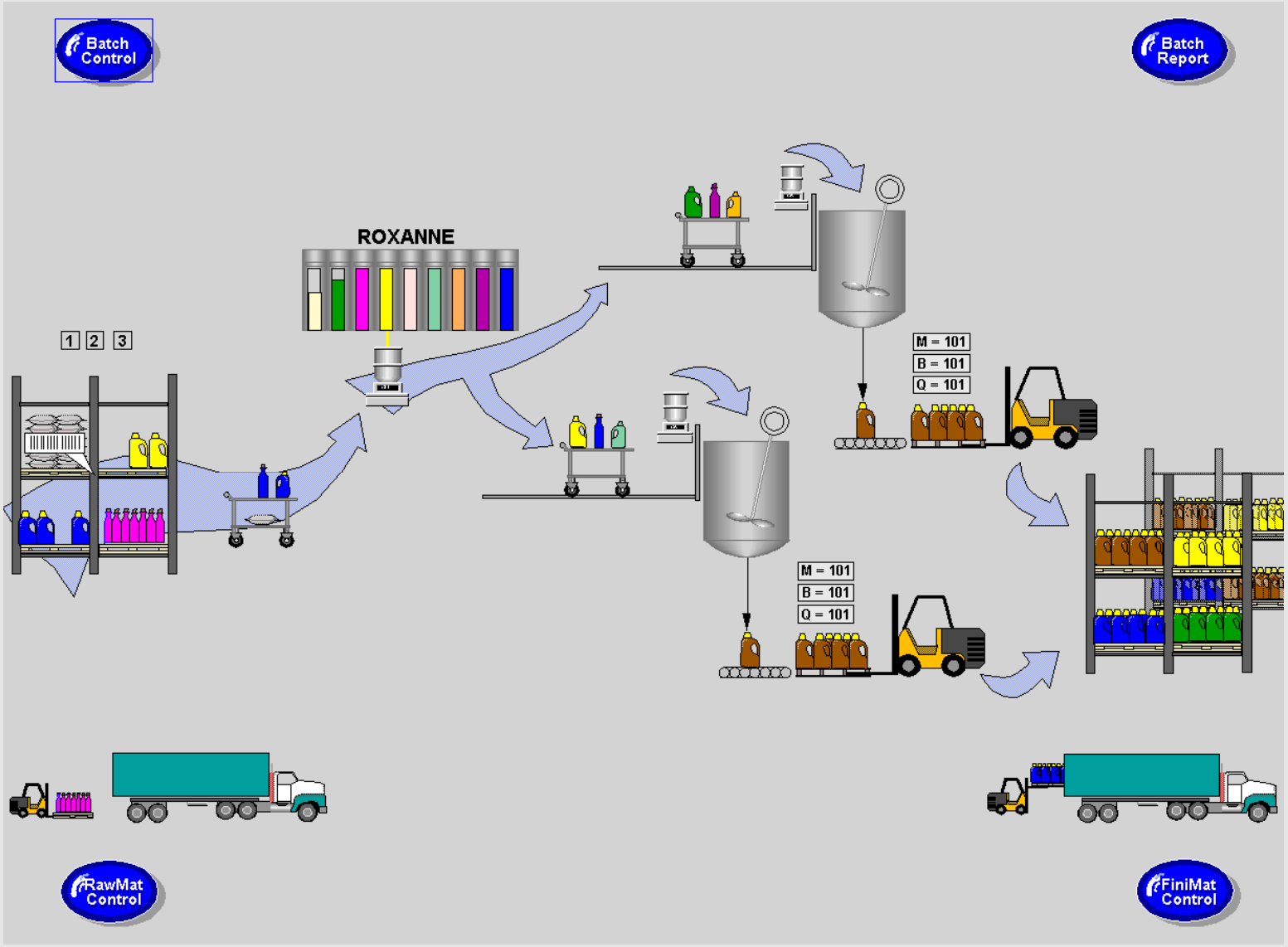
Production III



S88.01 as guideline for process modelling

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The Procedural model

- How to make the product (recipes)

The Physical model

- What physical tools are needed to make the product (equipment)
- How to run that equipment (control activities)

- **S88.01** is not just a standard for software, equipment, or procedures; it is a design philosophy.

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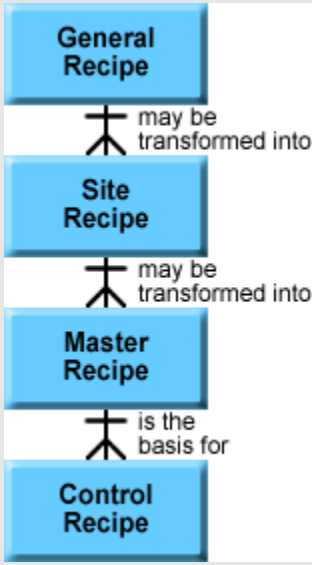
S88.01 Procedural Model

- **Recipes** define the necessary set of information that uniquely identifies the production requirements for a specific product
- **General recipe** is used at the company level and is the basis for lower-level recipes. It defines raw materials and their quantities, and the required processing to make the product.
- **Site recipe** is specific to a manufacturing site. It is usually derived from the general recipe to meet specific conditions or constraints of the site manufacturing the product.
- **Master recipe** is the template for recipes used to produce individual batches.
- **Control recipe** is used to create a single, specific batch. Control recipes can be modified for a specific batch.



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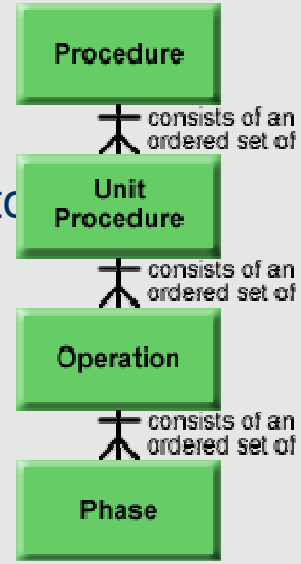
Procedural model

- A **procedure** is the highest-level in the procedural control hierarchy. It defines the overall strategy for making a batch.
- A **unit procedure** is an ordered set of operations that is carried to completion on a single *unit*
- An **operation** is an ordered set of phases carried to completion within a single unit.
- A **phase** is the smallest element of procedural control that can accomplish process-oriented tasks.



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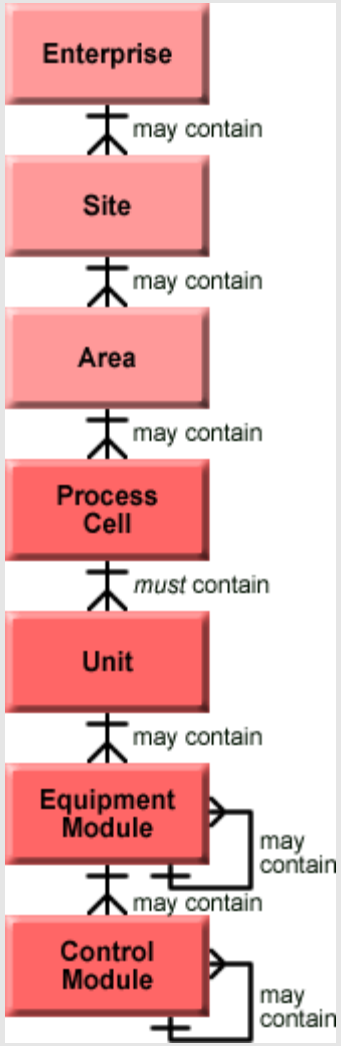
S88.01 Physical Model

- **Enterprise** is the company or a division or business unit.
- **Site** is the production plant based on geography
- **Areas** are different sections of a site
- **Process Cell** is a group of equipment required for one batch
- **Unit** is the smallest part of a process in where product is being changed or where product can be stored
- **Equipment Module** is a functional group of equipment that can carry out a finite number of specific minor processing activities. Processing activities like filling, emptying, heating, mixing etc.
- **Control Module is** typically a piece or collection of sensors, actuators etc.



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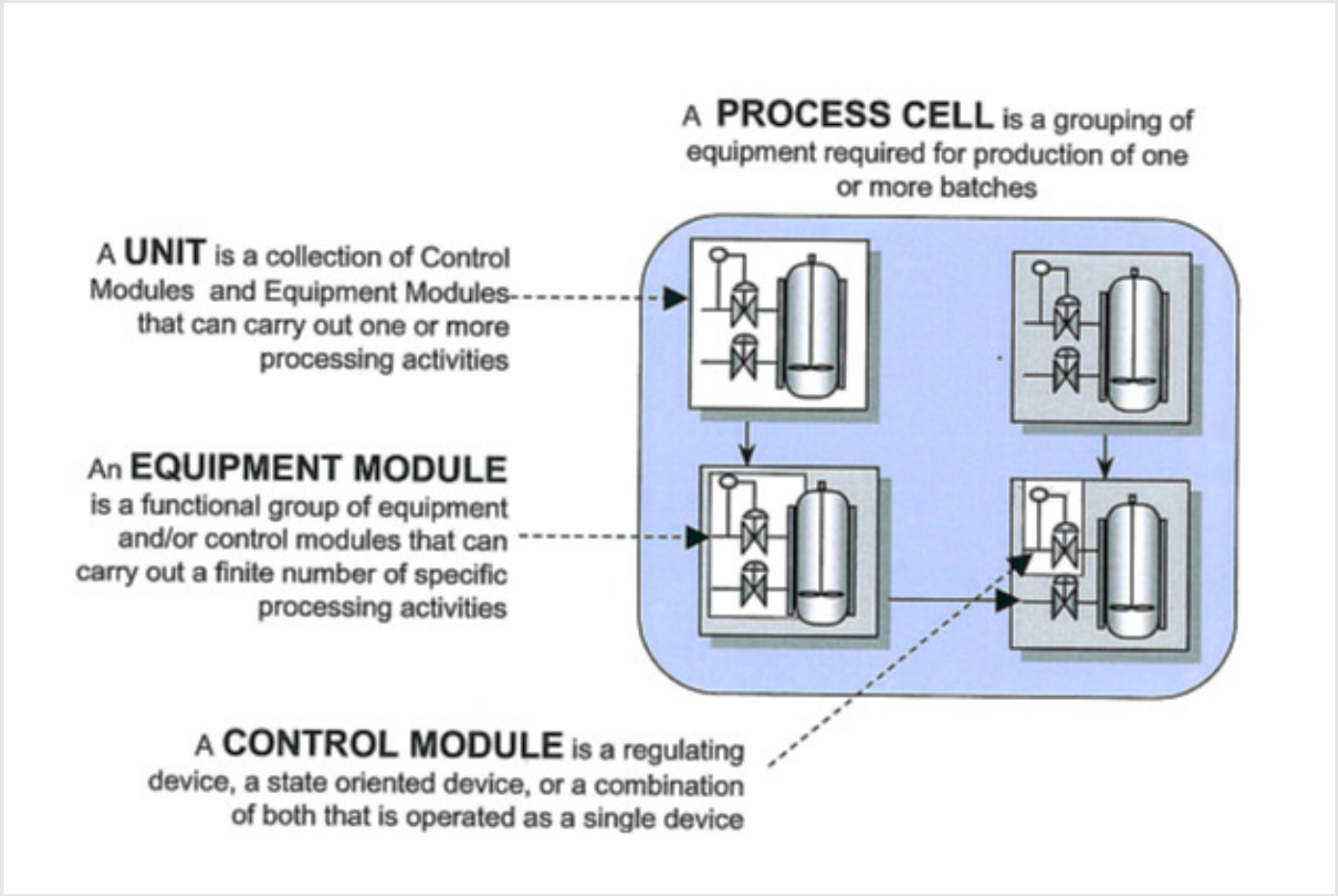
S88.01 Physical Model



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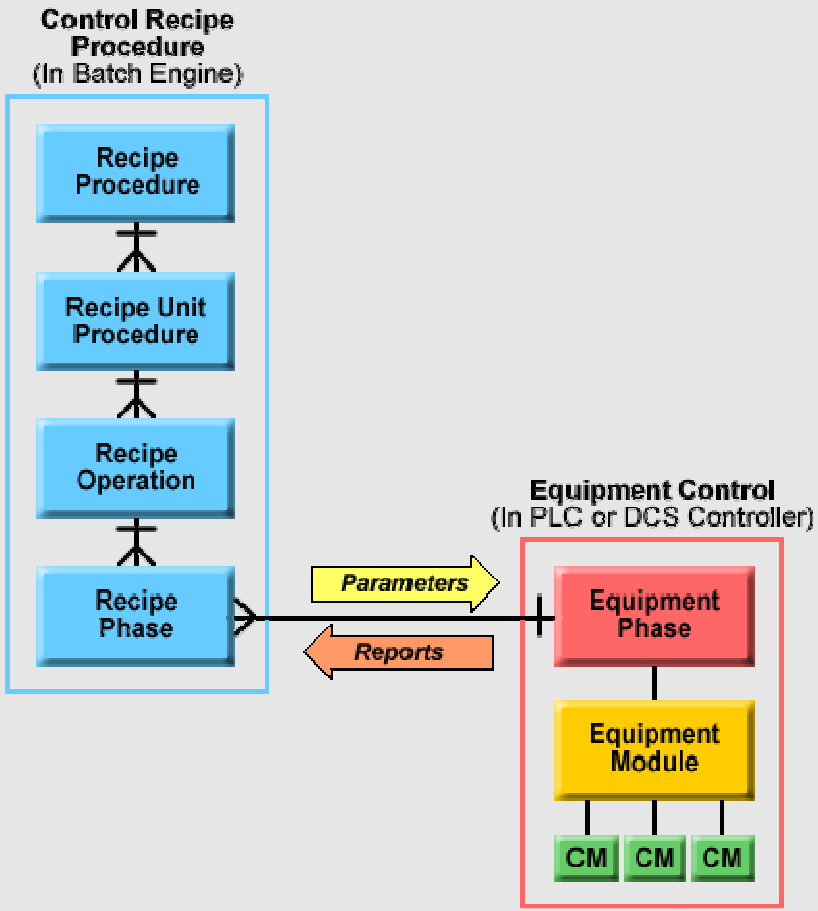
Linking recipes to equipment



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Differences between batch systems

- According to the S88 standard, a storage tank is seen as common equipment, but according to most batch systems you have to define a tank as a Unit.
- Procedures, operation and phases are programmed in the control system (DeltaV), or phases are linked manually between the Batch system and the control system (InBatch, IA series Batch og andre)
- The process model must be defined seperately in the Batch server, or the batch model is available as the procedures, operations and phases are available in the program.
- All systems use Unit phases, and some use Transfer phases as well.
- Automatic equipment allocation according to material requirement.
- Use of Manual phases.

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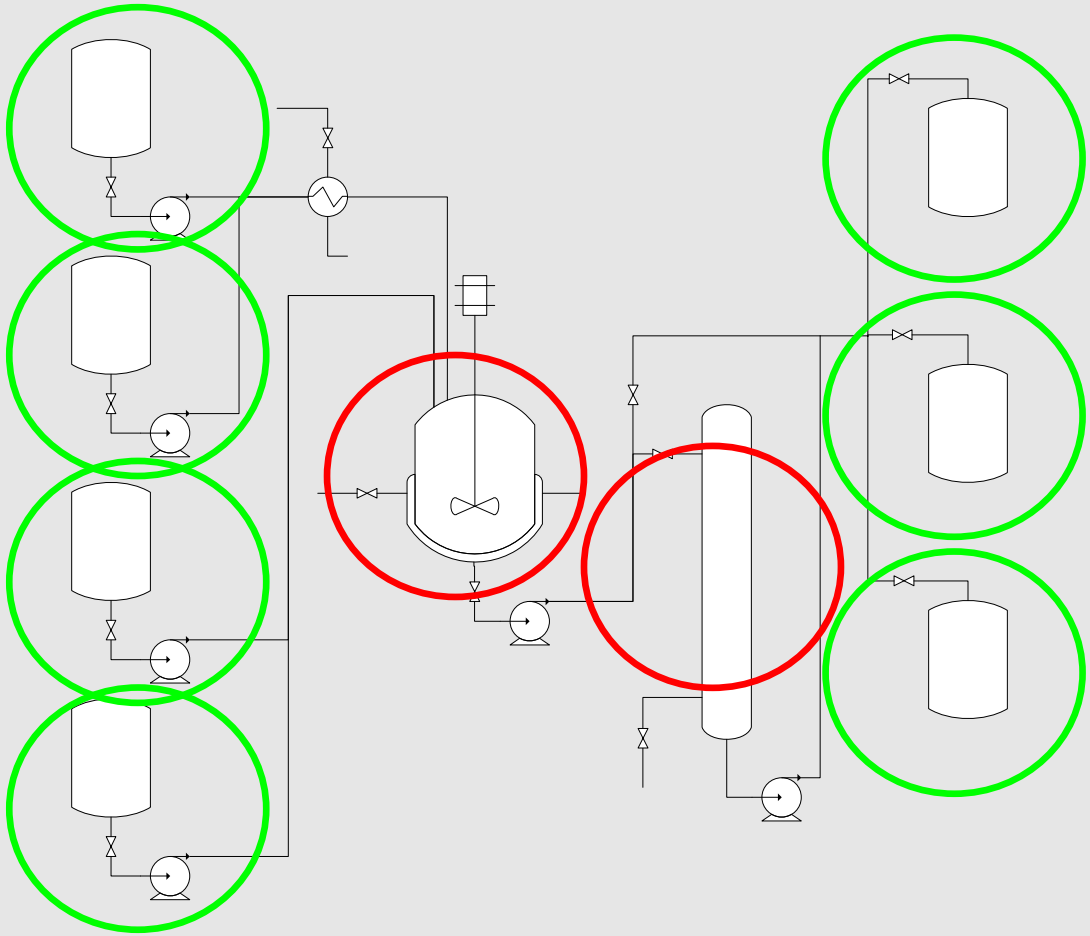
Model example with Unit definition



7 Storage tanks

2 Process Units

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Danisco and the S88 standard

- S88 philosophy used at all process types, like:
  - batch processes
  - continues processes
  - manual processes
- In general the process model is made for projects
- Numbering of equipment reflects the process model
- We always try to reflect equipment modules and phases in the program, even when no batch engine is used
- The goal for a complete Recipe is:
  - How much raw material is consumed per batch
  - Required time for production, or even occupation time of the plant
  - How much product and byproduct is produced