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Handling Fluid Fertilizers

- Selecting the Right
  - Equipment Components

Considerations

- **Systematic approach**
- Compatible components
- Short term vs. long term
- Plan ahead for future expansion

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Overview

- **Evaluation of the project**
- **Define the requirements**
- **Define what you have to work with**
- **Match the components**

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Evaluation of the project

- **What do I want and where do I want to go**
- **New or Existing Site**
- **Environmental issues**
- **Budgetary concerns**

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- What do I want and where do I want to go
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New Site

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Existing Site

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Old Existing Site

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Define the requirements

- Throughput
- Products
- Manpower

Design with Direction

- **Develop a plan**
- **Work from a flow diagram**
- **Allow a realistic time frame**

Design with Direction

- Develop a plan
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  - Simple Flow Diagram
  - Cad designed diagram
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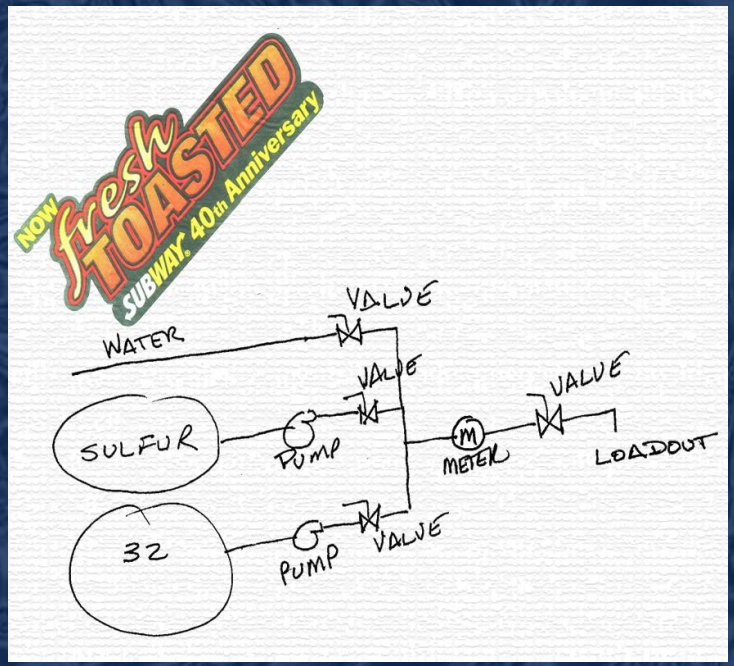

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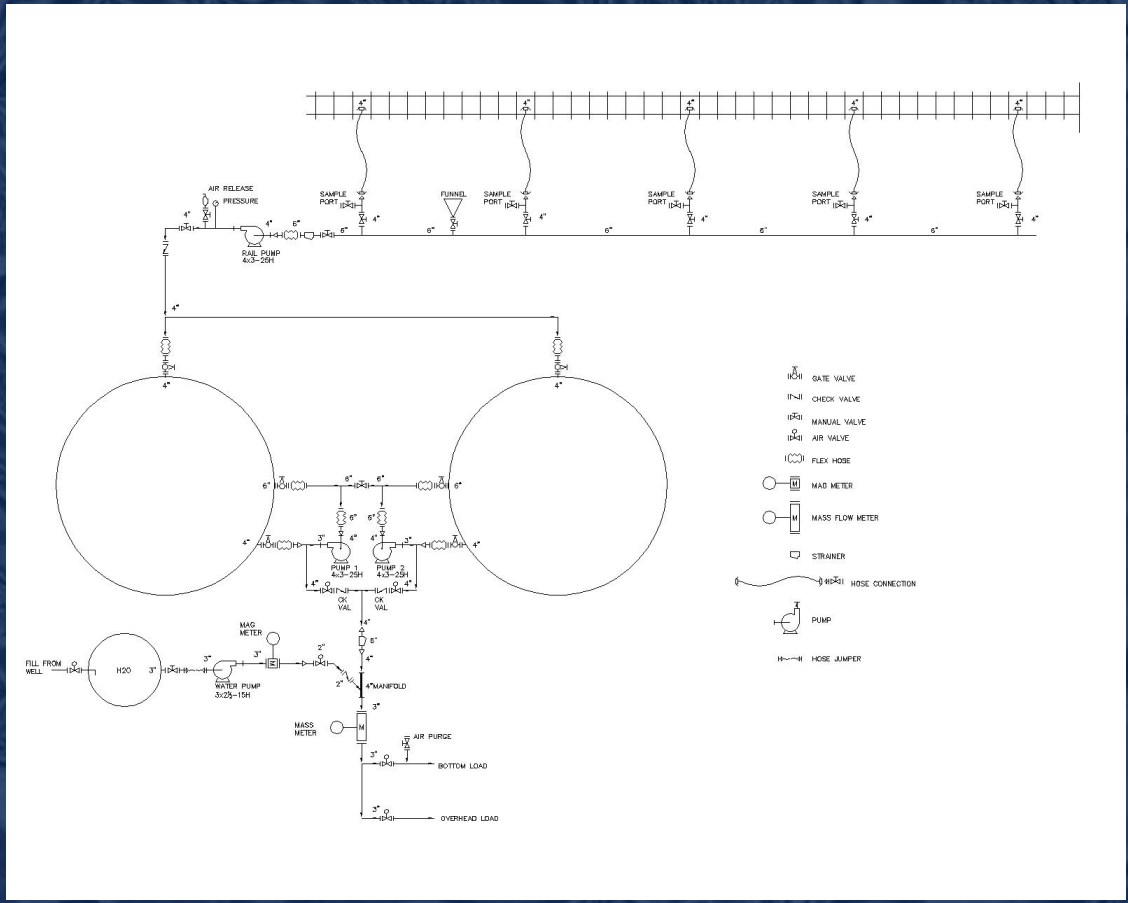

Design with Direction

- Develop a plan
- Work from a flow diagram.
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Match the components

- Storage Tanks
- Pumps
- Measurement
- Piping
- Inload
- Loadout

Common Themes

- Material of construction
- Product mix
- System capacity
- Quality control
- Labor

Storage Requirements

- Amount of Product Through-Put
- Products
- Seasonal storage
- Secondary Containment

Tanks

- Size
- Shape
- Material
- Fittings
- Foundation

Pumps and Plumbing

- System Capacity
  - Load size
  - Time
  - Plan for growth

Plumbing

- Size
  - Suction vs. Discharge
  - 2” to 150 gpm
  - 3” to 300 gpm
  - 4” to 450 gpm
  - 6” to 800 gpm
  - Oversize long runs

Plumbing Selection Criteria

- Flow characteristics
- Corrosion resistance
- Strength
- Cost of Installation
- Flexibility for changes
- Weld or thread?

Plumbing Materials

- Hose
- PVC
- Mild steel
- Stainless steel
- Poly
- Combinations

System using hose and prefabricated stainless steel fittings.

Pump Selection

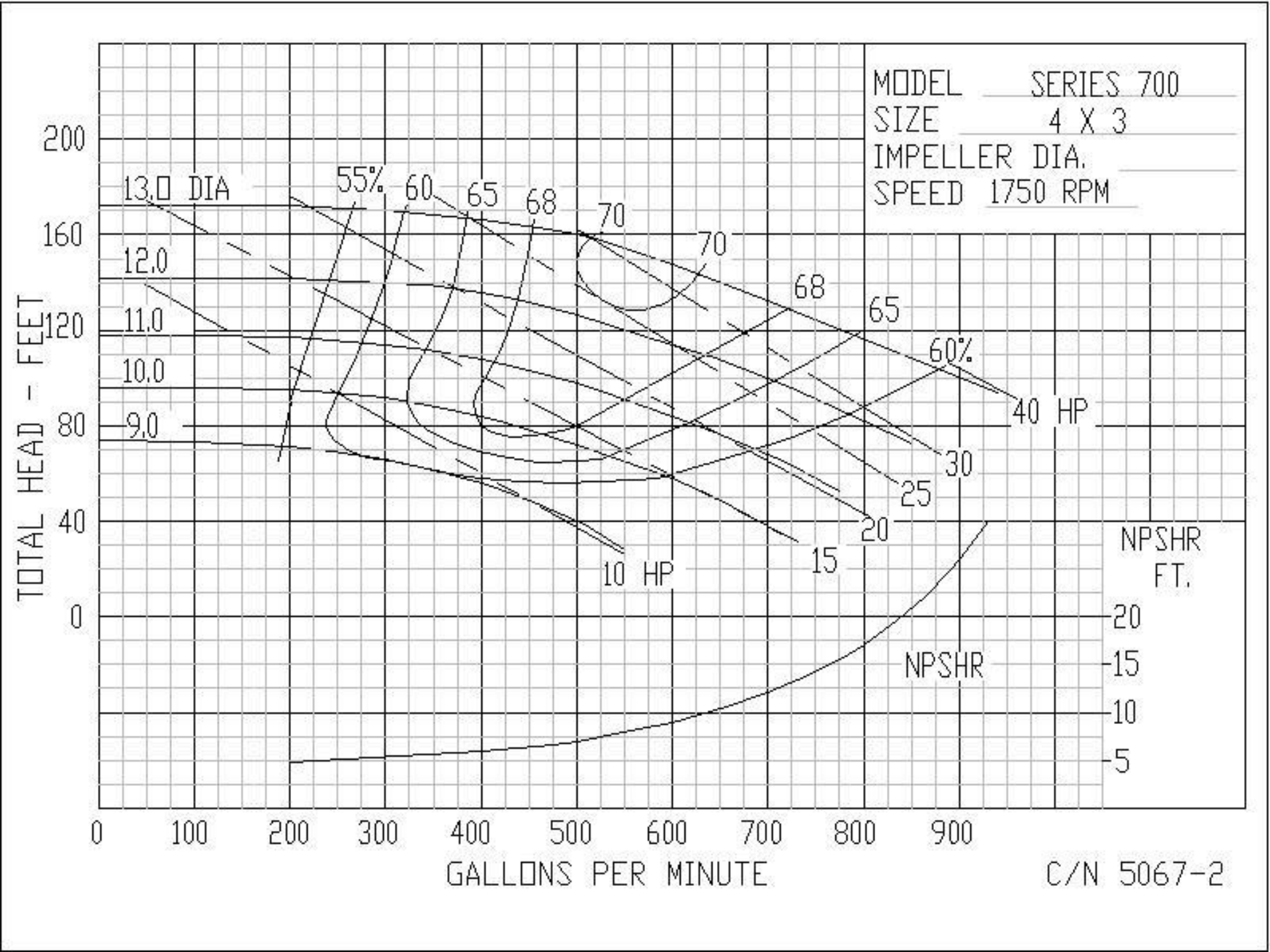
- Type
  - Self-priming centrifugal
  - Straight centrifugal
  - Positive displacement
- Capacity (not size)
- Material
- Seals Or Packed Box

Pump Performance

- Design
- Impeller
  - Size
  - Shape
- Speed

Pump Curve

- Flow rate vs. head
- Horsepower
- NPSH
- Efficiency


MODEL SERIES 700
SIZE 4 X 3
IMPELLER DIA.
SPEED 1750 RPM
13.0 DIA
12.0
11.0
10.0
9.0
55%
60
65
68
70
70
68
65
60%
40 HP
30
25
20
15
10 HP
NPSHR
FT.
NPSHR
TOTAL HEAD - FEET
GALLONS PER MINUTE
C/N 5067-2
200
160
120
80
40
0
0
100
200
300
400
500
600
700
800
900
20
15
10
5

Measurement

- Scales
- Meters
  - Flow rate
  - Accuracy
    - Quality control
    - Custody transfer

Types of Meters

- Positive Displacement
- Turbine/Squirrel cage
- Electromagnetic
- Coriolis Mass Flow

Positive Displacement

- Liquid moves into a measuring chamber and the number of “Units” are counted
- Volumetric
- Accuracy of some affected more than others by changes in product and flow.
- Lots of moving parts.

Turbine Meters

- Volumetric
- Liquid moving through meter causes rotor to turn in proportion to flow rate
- Straight pipe requirements
- Changes in flow rate and viscosity can have large effect on accuracy
- Some moving parts

“Mag” Meters

- Volumetric.
- Measures velocity of liquid through a tube of known area.
- Liquid must be electrically conductive.
- Highly accurate across large range of flow rates and viscosities.
- Less straight pipe needed.
- No moving parts to wear out.

Mass Flow Meters

- Measures mass or weight.
- Accurate to .05% of flow rate.
- Doesn’t care what liquid it’s measuring.
- High turndown ratio.
- Only moving parts are oscillating tubes.

Calibrate!

- All meters can lose calibration over time.
- Mechanical types more susceptible to wear.
  - Flow rate.
  - Compatibility.
- If calibrating volumetric meters by weight, know the true density of the product.

Controlling the Flow

- Valves
- Manifolds
- Control systems

Valve Selection

- Style
- Construction
- Operation

Types of Valves

- Ball valves
- Butterfly valves
- Gate valves
- Check valves

Manifolds

- Suction manifolds
- Injection manifolds

Control Systems

- Manual
- Actuated valves
- Presets
- Automation

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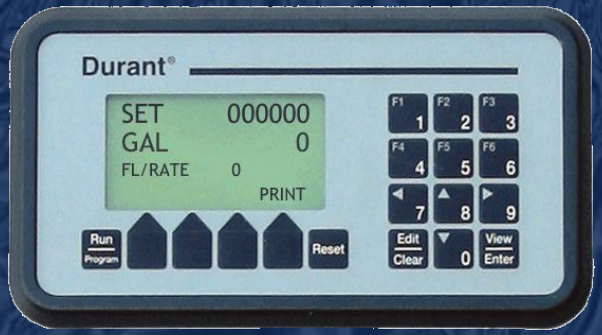

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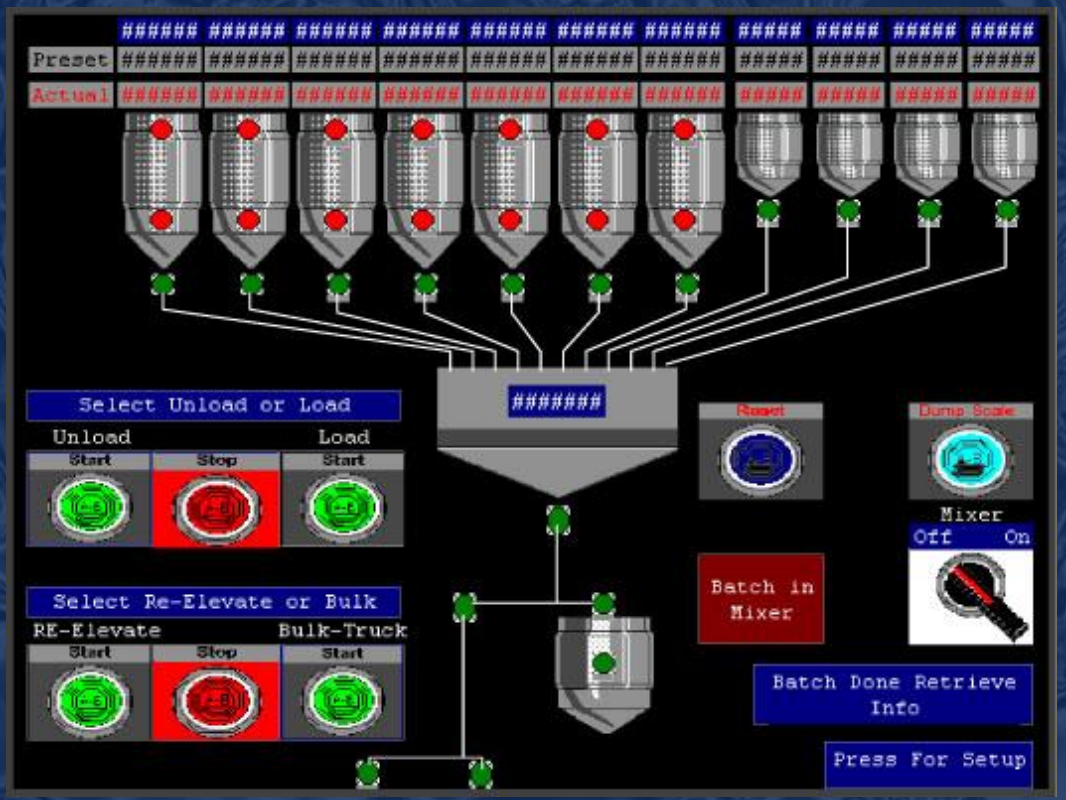
Dry Tower Automation



Unattended Loadout Panels

- Multiple remote sites from one office
- Custody transfer with approved devices
- Custom bills of lading
- Field identification
- Detailed transaction reporting
- Secure remote site management
- Communication
  - Modem, direct cable, internet, wireless

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http://www.murrayequipment.com