

KLM

**Technology
Group**

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Solutions, Standards and Software



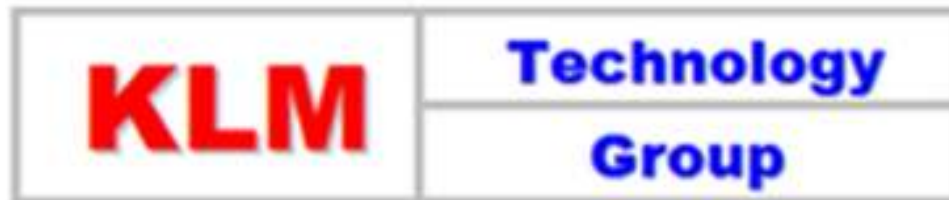
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Solutions, Standards and Software

Based in USA since 1995,

KLM is a technical consultancy group, providing specialized services and equipment to improve process plant operational efficiency, profitability and safety.



Today we are discussing

Introduction To Distillation Troubleshooting

We also offer,

Advanced Distillation Troubleshooting

Process Equipment Design and Troubleshooting

Refinery Crude Unit Design and Troubleshooting

Ethylene Unit Design and Troubleshooting

As well as other process units and equipment groups. They can be found on the website.

We also have a series on

Introduction To Process Simulation

We also offer,

Advanced Process Simulation

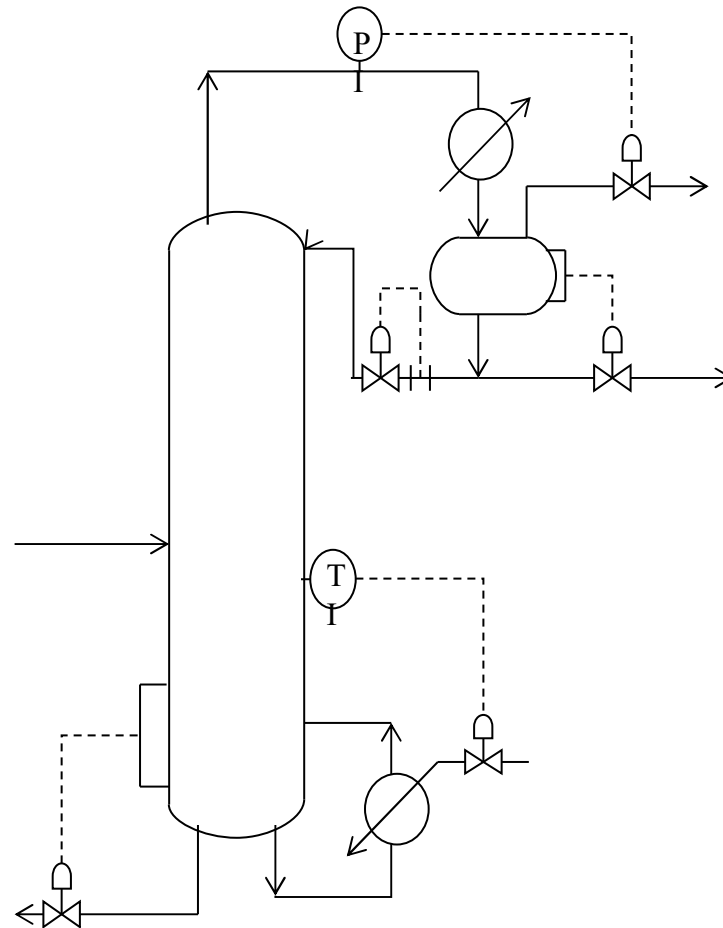
Refinery Process Simulation

Ethylene Unit Process Simulation

Introduction to Distillation Troubleshooting

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1. Do the simple Checks First



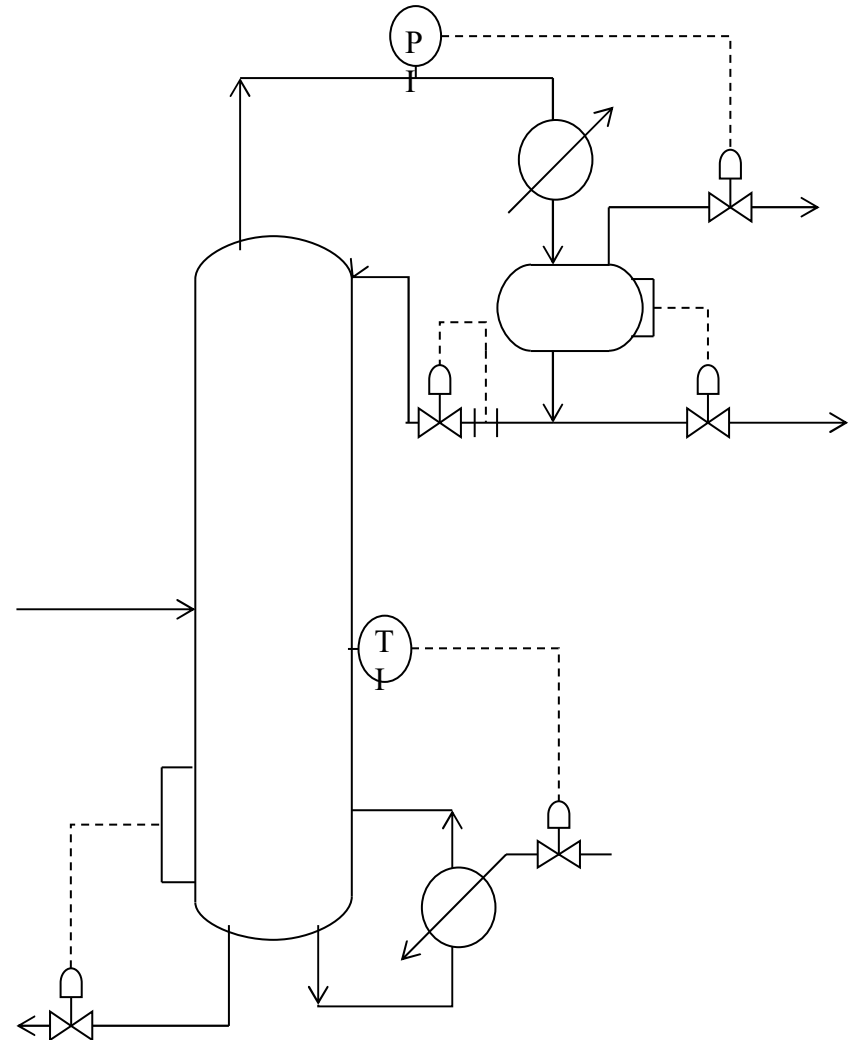
Introduction to Distillation Troubleshooting

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a. Verify the Tower Levels

Work with operations,
confirm the levels.

What percent of the
time would you guess
that when you go to a
Tower Troubleshooting
they cannot find the
tower levels?



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a. Verify the Tower Levels

In my career, it is greater than 20%, and it is always the tower bottoms level. If the tower bottoms level is higher than the reboiler return, the reboiler will not function.

You normally can install a pressure gauge on the tower bottoms line and calculate the tower level.



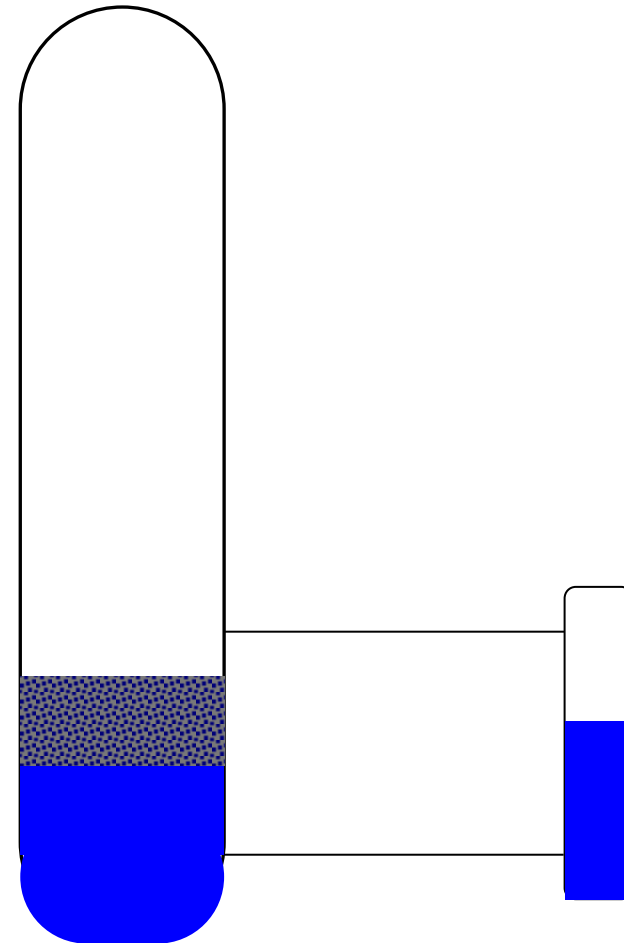
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Level Instrumentation Challenges

The tower bottoms will be frothy and at a higher temperature than the level leg.

Because the principle of level measurement is Bernoulli's Equation (density times gravitational force times height) the density has a direct effect on the measurement.



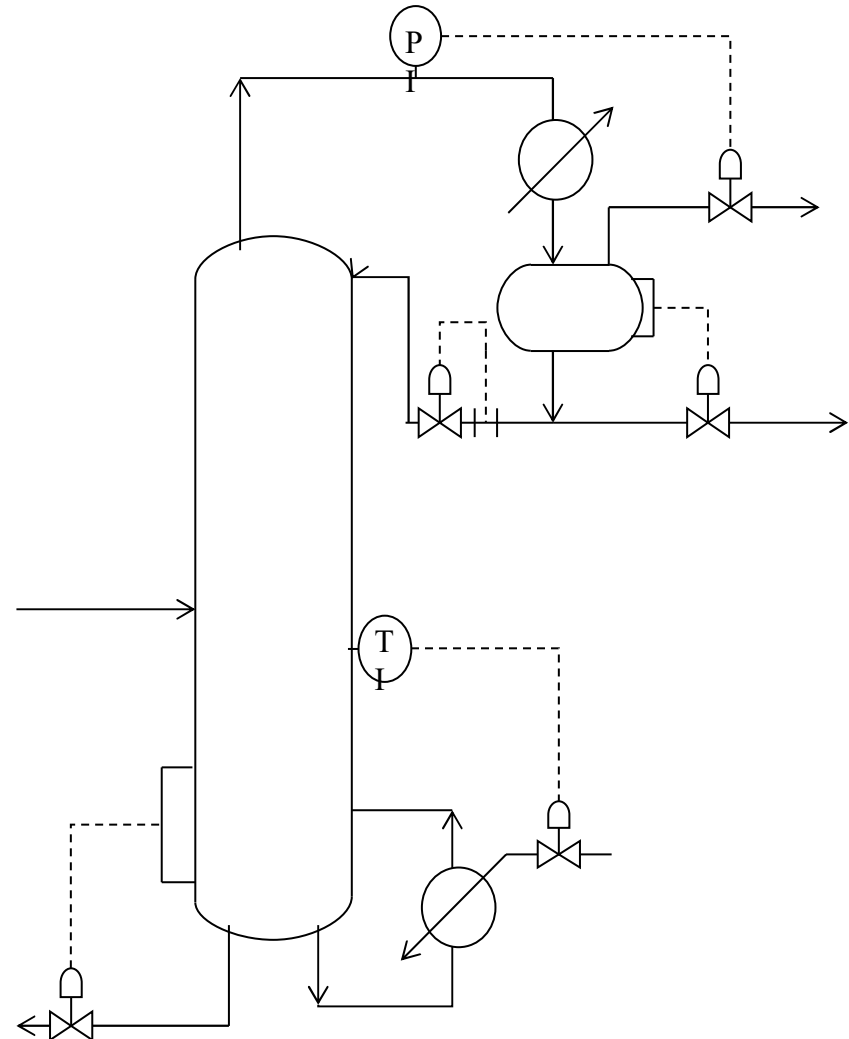
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b. Perform a Tower Pressure Drop

You normally can place
a pressure gauge in
three places.

1. Top of Bottoms Level
Sight Glass Bridle
2. Tower OH Line
3. Top of OH Receiver
Sight Glass Bridle



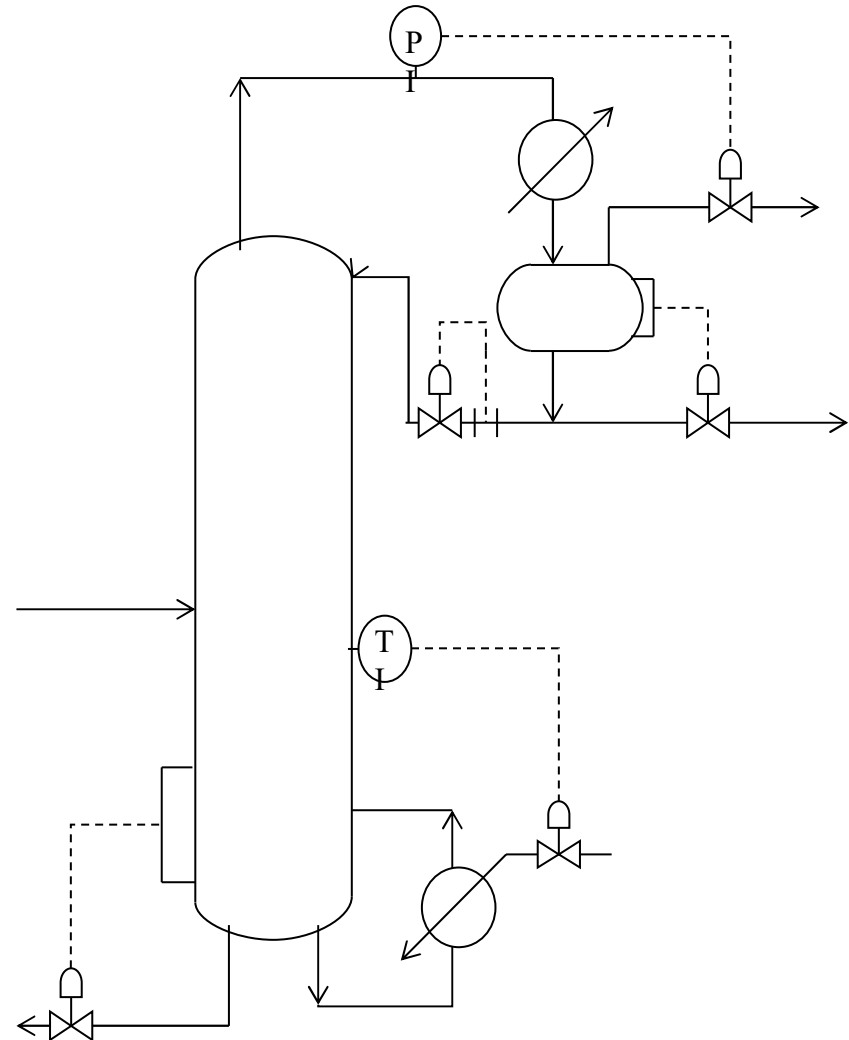
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b. Perform a Tower Pressure Drop

You should use the same
gauge, and you should
read the gauge.

You can review design
data and know
approximately what the
pressure drop should be.



Introduction to Distillation Troubleshooting

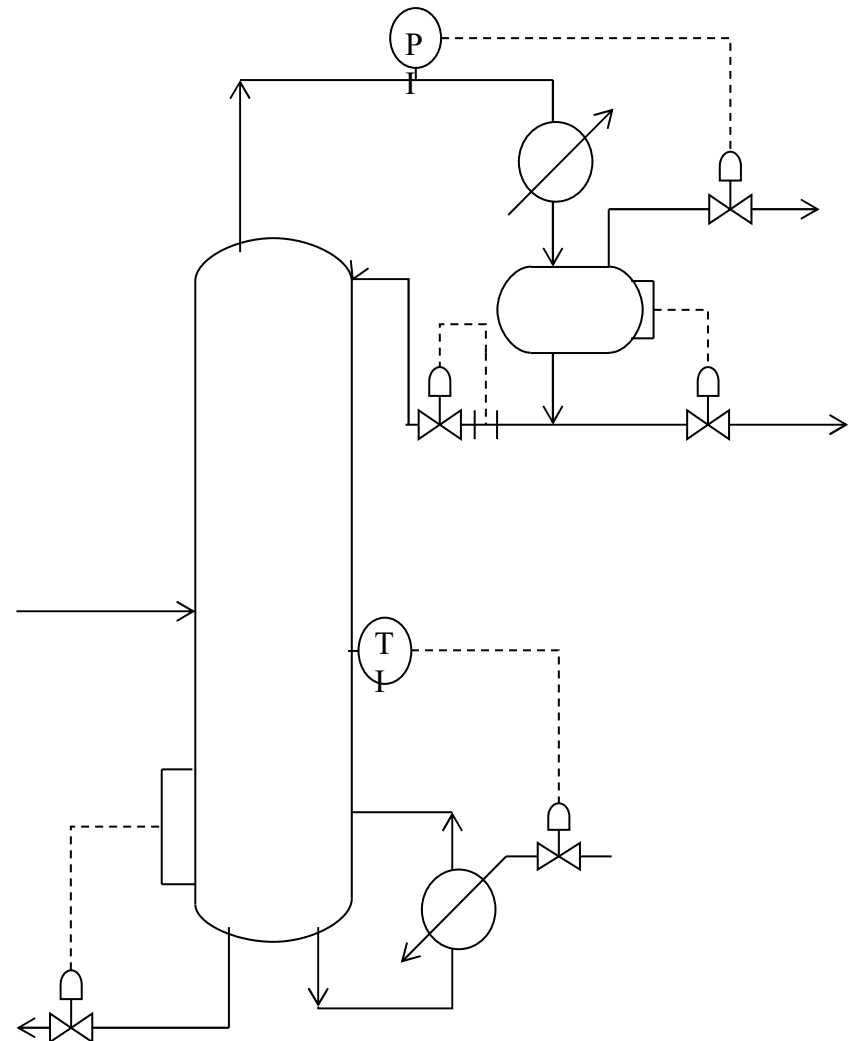
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b. Perform a Tower Pressure Drop

Suppose you have 30
trays and you are
expecting a pressure
drop of 3 psi (0.2 bar)

What does it mean if you
have a high pressure
drop?

What does it mean if you
find a low pressure drop?



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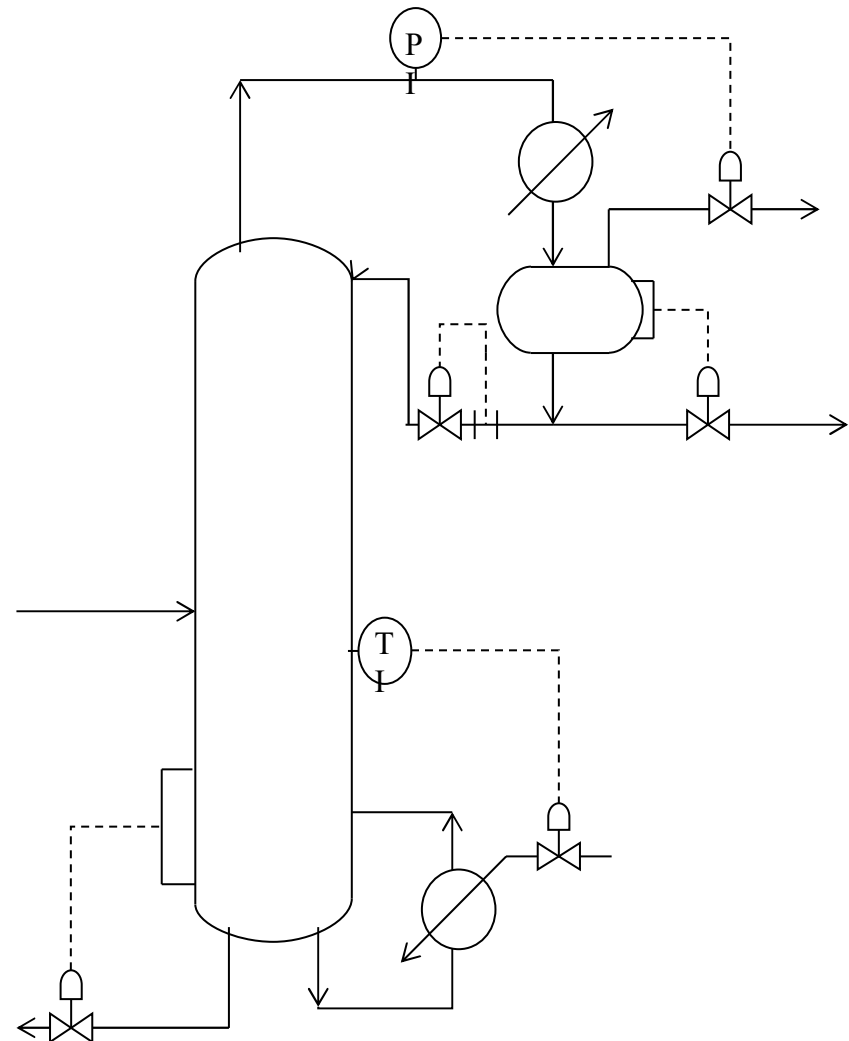
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b. Perform a Tower Pressure Drop

**What is the normal
pressure drop design of
a heat exchanger – about
5 psi (0.35 bar)**

**What does it mean if you
have a high pressure
drop?**

**What does it mean if you
find a low pressure drop?**



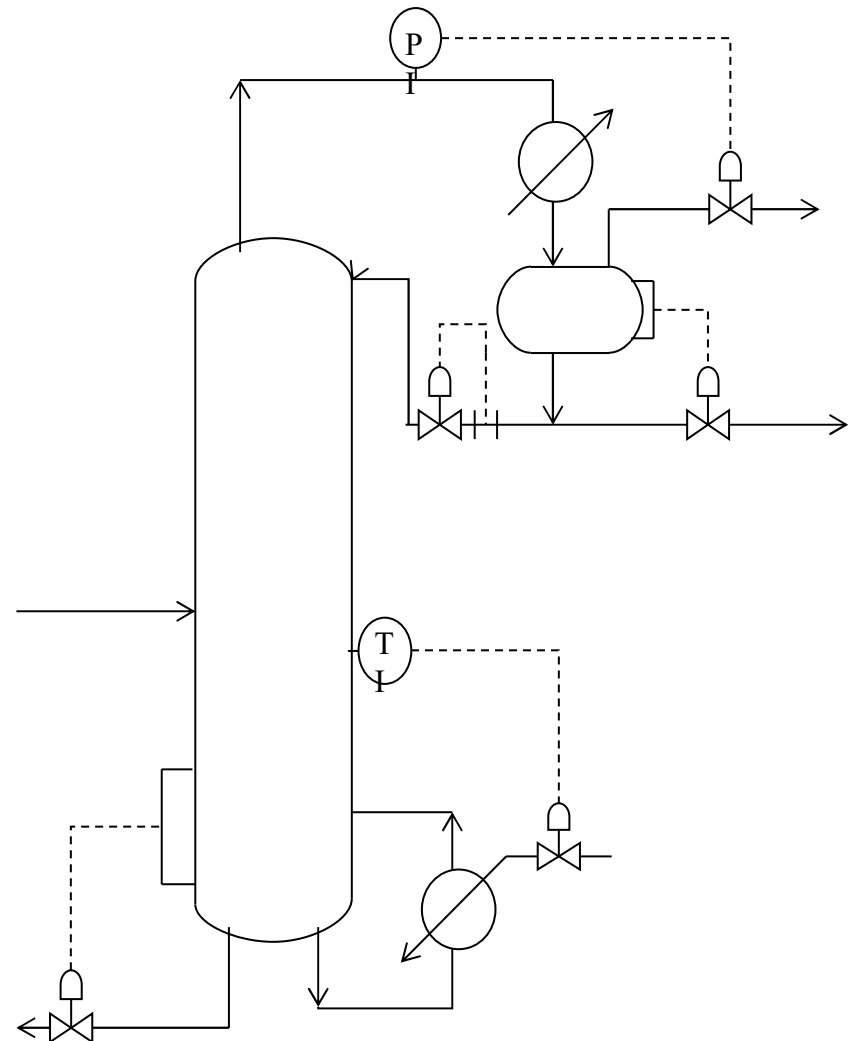
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b. Perform a Tower Pressure Drop

In my career, about 20%
of the time you can
identify the problem with
a tower pressure profile.

Next you scan the
column to get a better
picture.



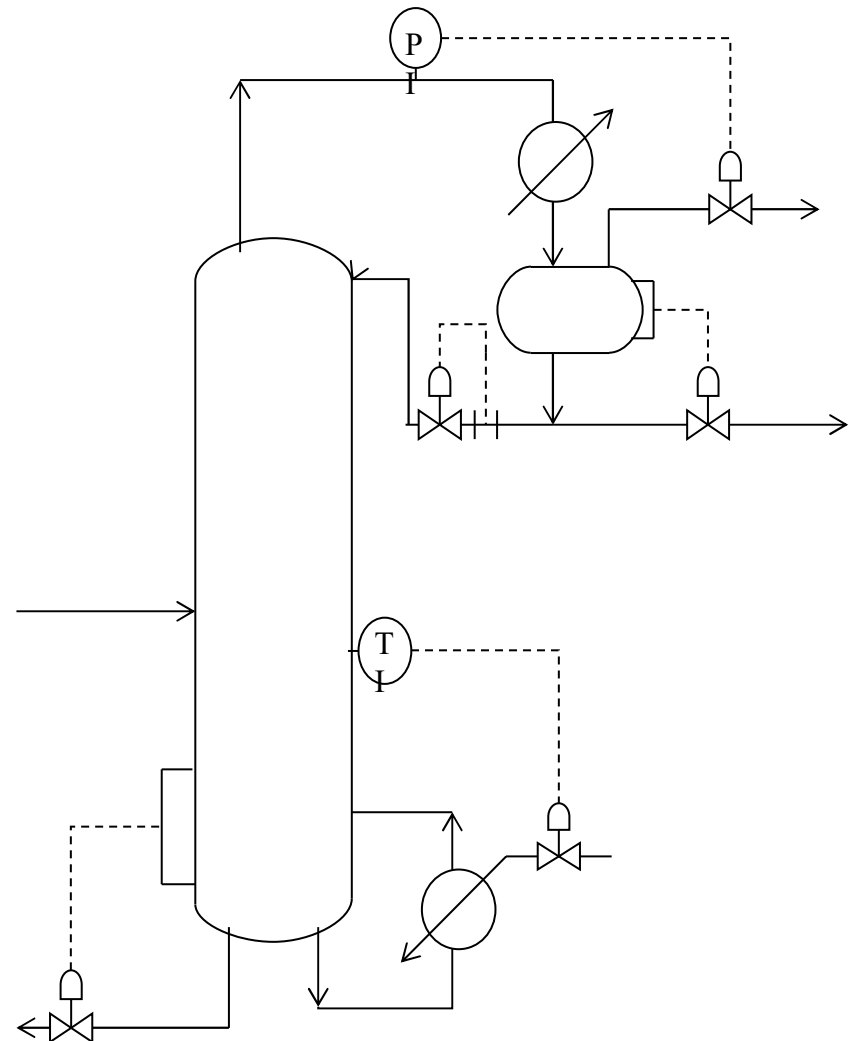
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c. Perform a Tower Temperature Profile

You take a temperature
gun and survey the tower
temperatures.

1. Feed
2. Bottoms
3. Overhead Temp
4. Reflux Temp
5. Reboiler heat input
6. OH Receiver Cooling
in and out



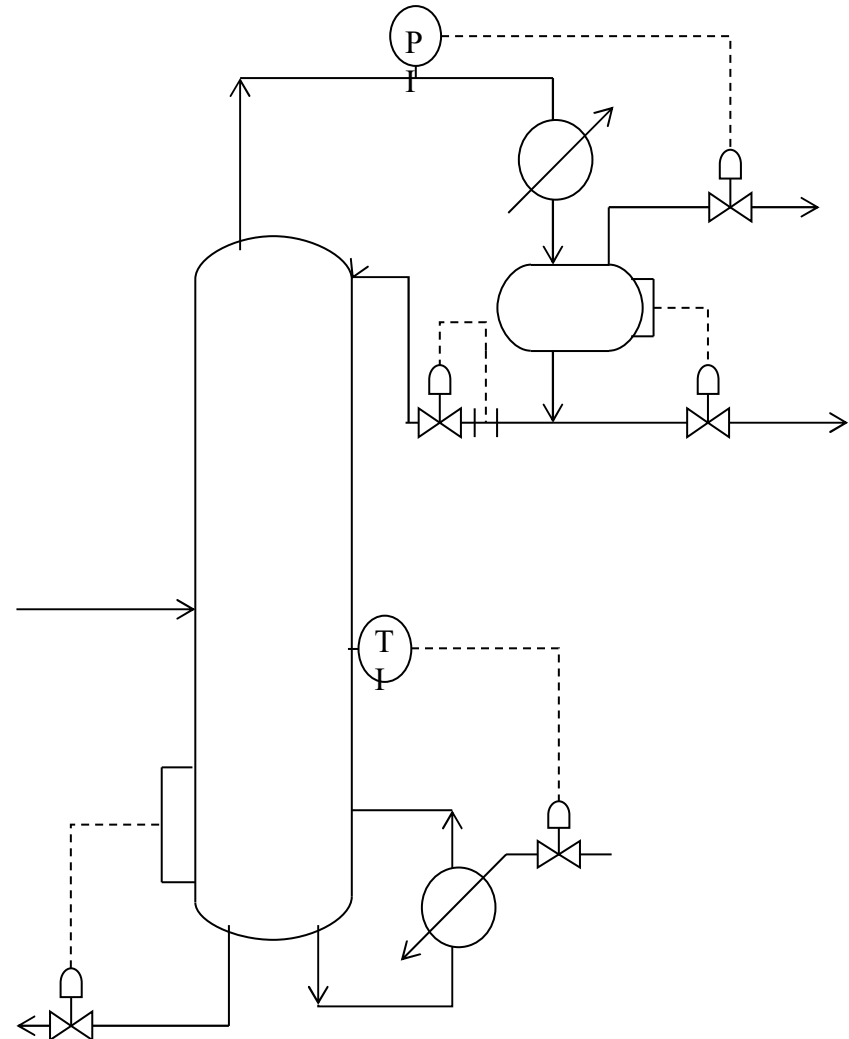
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c. Perform a Tower Temperature Profile

**What can happen if your
feed is much hotter than
design?**

**What can happen if your
feed is much colder than
design?**



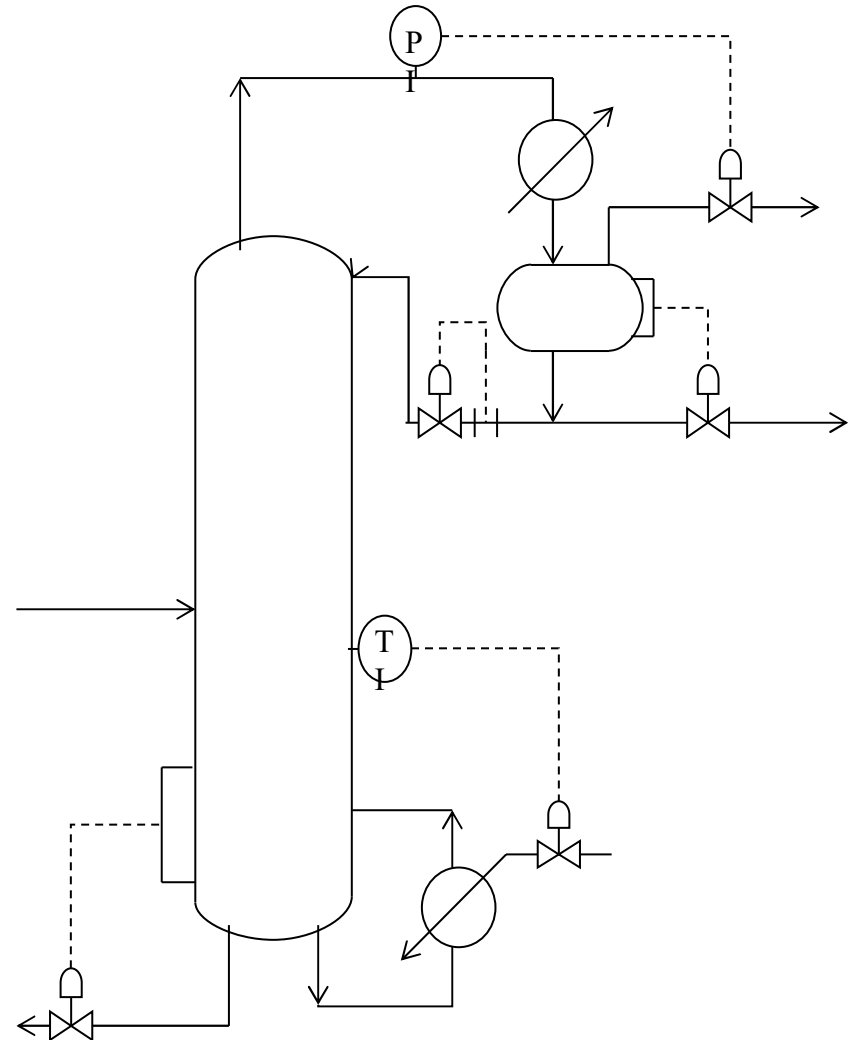
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c. Perform a Tower Temperature Profile

**What can happen if your
reflux is much hotter
than design?**

**What can happen if your
reflux is much colder
than design?**

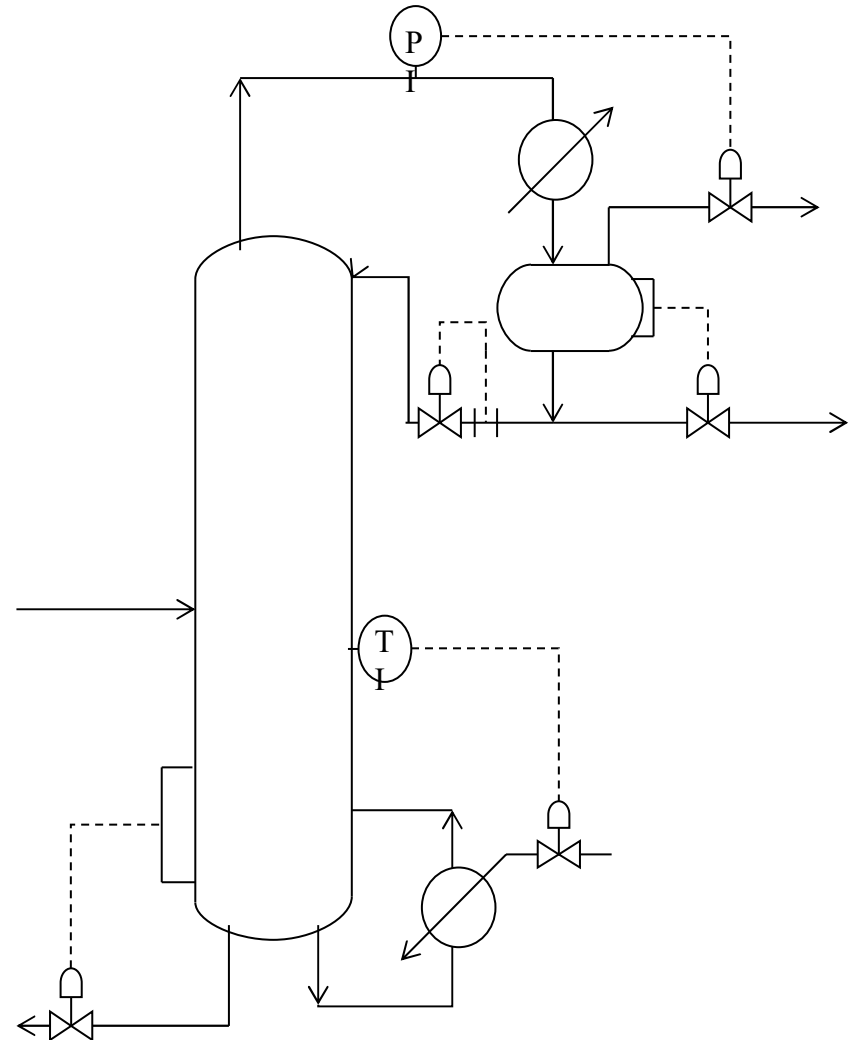


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c. Perform a Tower Temperature Profile

What does it mean if our
cooling water in and out
is the same temperature?



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Do the simple Checks First

- a) Verify the Level**
- b) Perform a Pressure Survey**
- c) Perform a Temperature Survey**

After you have completed the simple checks first – then begin to look deeper

- 1. Sample the Feeds – has the feed changed from the design**
- 2. Build a Mass Balance – if it is not within 2 – 5% get the meters calibrated – you can also do a component balance.**
- 3. Perform a simulation**
 - A. You have the pressure and temperature profiles**
- 4. Look at hydraulic profiles**

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Perform a simulation - What simulation tool should you use?

We helped write a paper in the October “Engineering Practice” Magazine.

A team of six people rated nine different simulation programs. Many categories were rated about equal.



One category where there was a difference, was in the time to complete a simulation - some were as much one third faster than the others.

The magazine can be found at;

www.iacpe.com/magazine

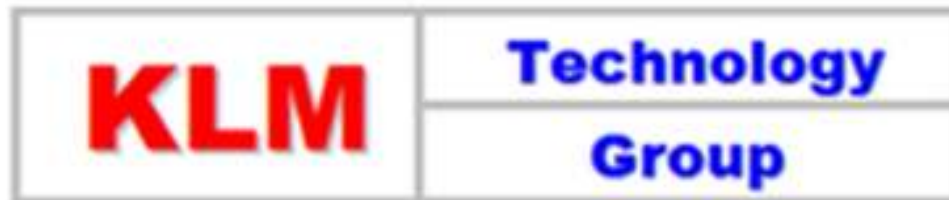
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- 1. Do the simple checks first**
- 2. Sample the Feeds**
- 3. Build a Mass Balance**
- 4. Perform a simulation**

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KLM Core Business

Training

Kolmetz Handbook of Process Equipment Design

Process Optimization Studies

HAZOP Facilitation

Engineering Support

<p>KLM Technology Group</p> <p>Practical Engineering Guidelines for Processing Plant Solutions</p>	 <p>SOLUTIONS, STANDARDS AND SOFTWARE</p> <p>www.klmtechgroup.com</p>	<p>Page : 1 of 58</p>
		<p>Rev: 04</p> <p>Rev 01 Jan 2007 Rev 02 May 2012 Rev 03 Sept 2012 Rev 04 Nov 2013</p>
<p>KLM Technology Group #03-12 Block Aronia, Jalan Sri Perkasa 2 Taman Tampoi Utama 81200 Johor Bahru Malaysia</p>	<p>Kolmetz Handbook of Process Equipment Design</p> <p>Piping Hydraulics Fluid Flow Line Sizing and Material Selection</p> <p>(ENGINEERING DESIGN GUIDELINE)</p>	<p>Co Author Rev 01 Ling Ai Li Rev 02 K Kolmetz Rev 03 Aprilia Jaya Rev 04 Aprilia Jaya</p> <p>Editor / Author Karl Kolmetz</p>

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We have a very large group of courses that we offer on the website;

www.klmtechgroup.com/training



Thank You

