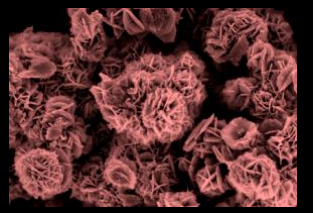



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CDB 4313Z – HEAT INTEGRATION

PROCESS INTEGRATION III

APPROPRIATE PLACEMENT OF SEPARATION UNITS

ZULFAN ADI PUTRA, PDENG

OFFICE: 05-03-08
TELP: 05 368 7562
EMAIL: zulfan.adiputra@utp.edu.my

Discussion time: Friday 15.00 – 17.00

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COURSE OVERVIEW

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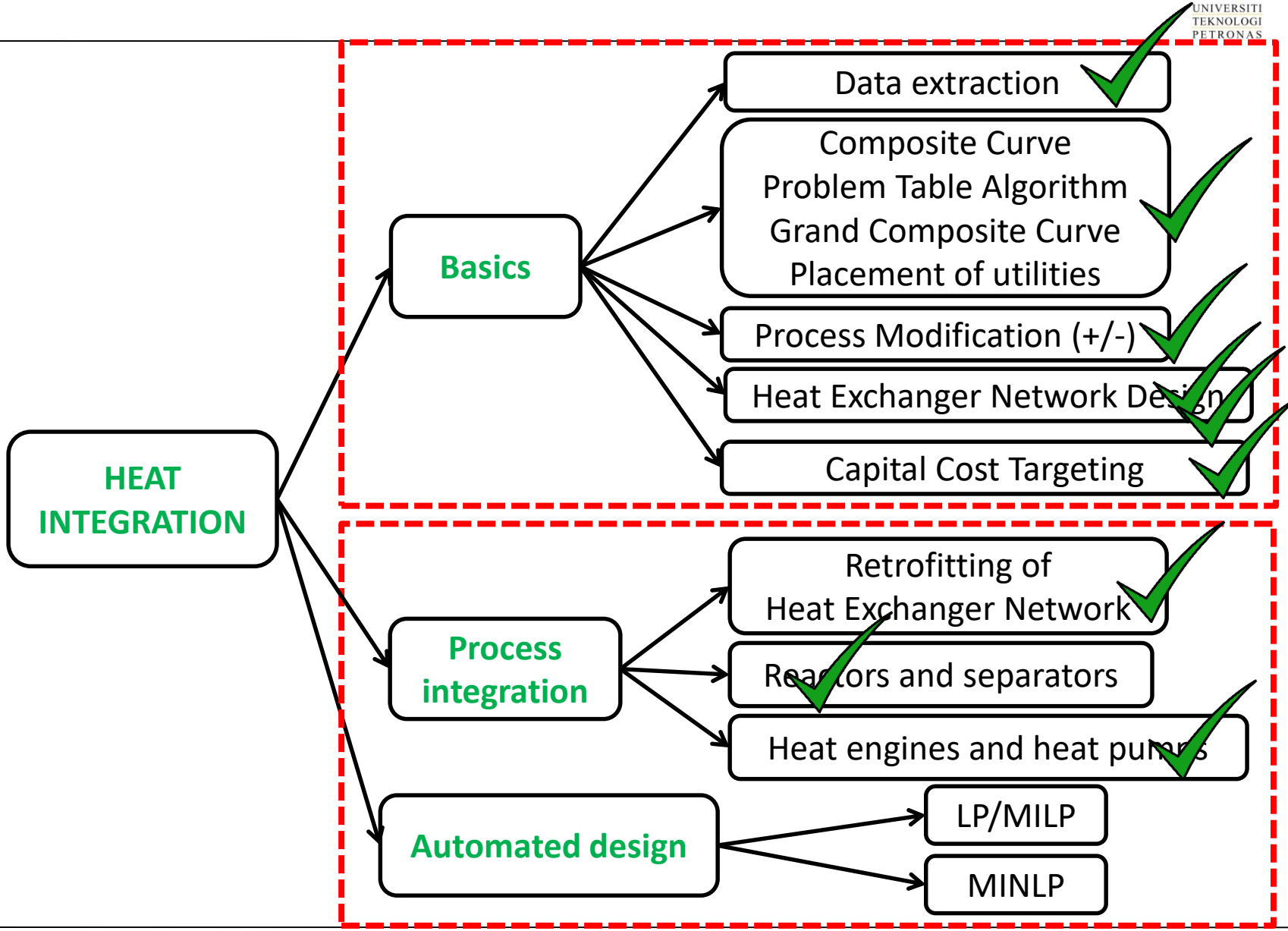

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COURSE LEARNING OUTCOMES

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At the end of this course, students shall be able to:

1. Perform **targeting exercise** to determine the minimum utility requirements and maximum heat recovery possible for a process using composite curve or problem table algorithm

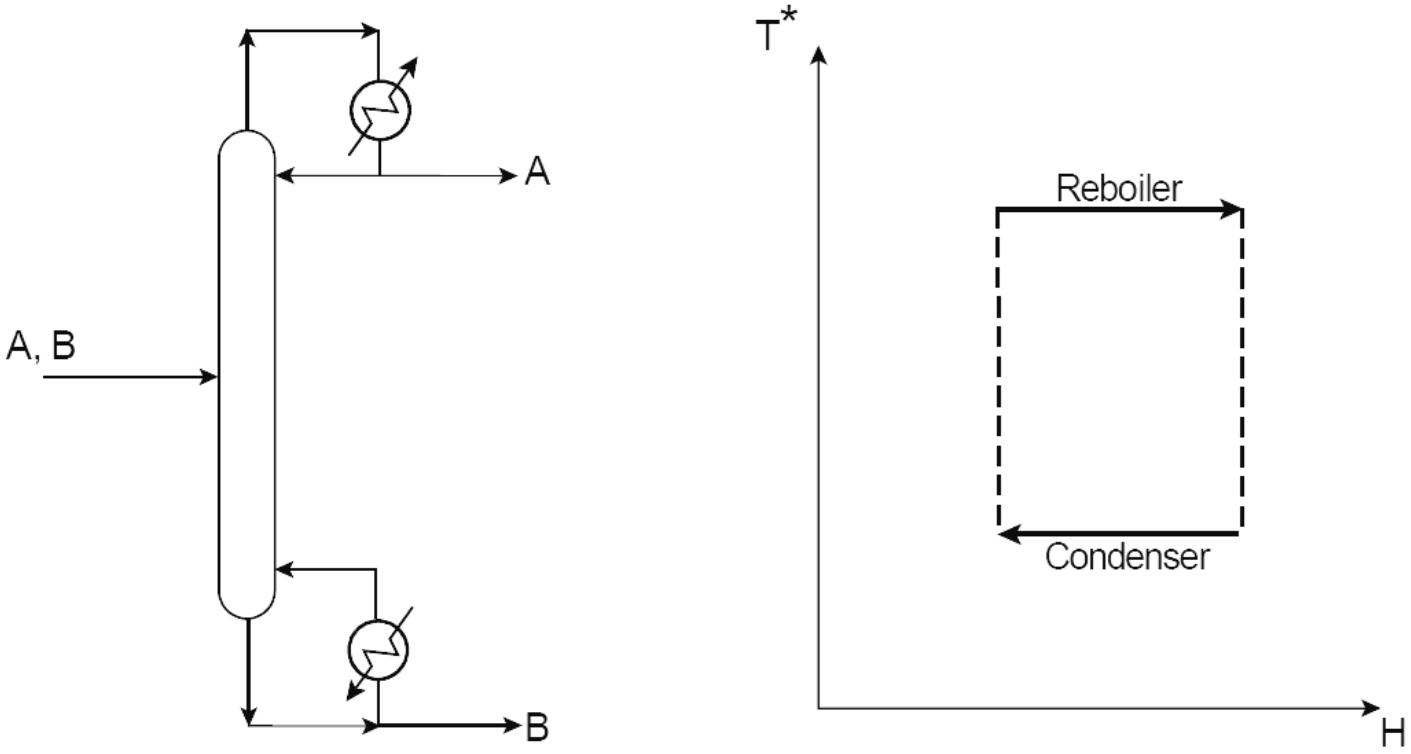
2. **Design heat exchanger network** for achieving maximum energy recovery or minimum total cost using pinch analysis technique

3. **Apply pinch analysis software** to perform heat integration and heat exchanger network design that is cost competitive and taking into account of sustainability factors

4. Analyze the **potential for heat and power integration** of a process and the possible implementation options, and to screen the options using cost effective strategy

5. Perform **correct data extraction** from process flowsheet for the purpose of performing pinch analysis

DISTILLATION COLUMNS



Opening Question:

- What normally defines the temperature levels reboiler and condenser?
- Can we change the temperature of reboiler and condenser?
- How do we change them?

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BRAINSTORM

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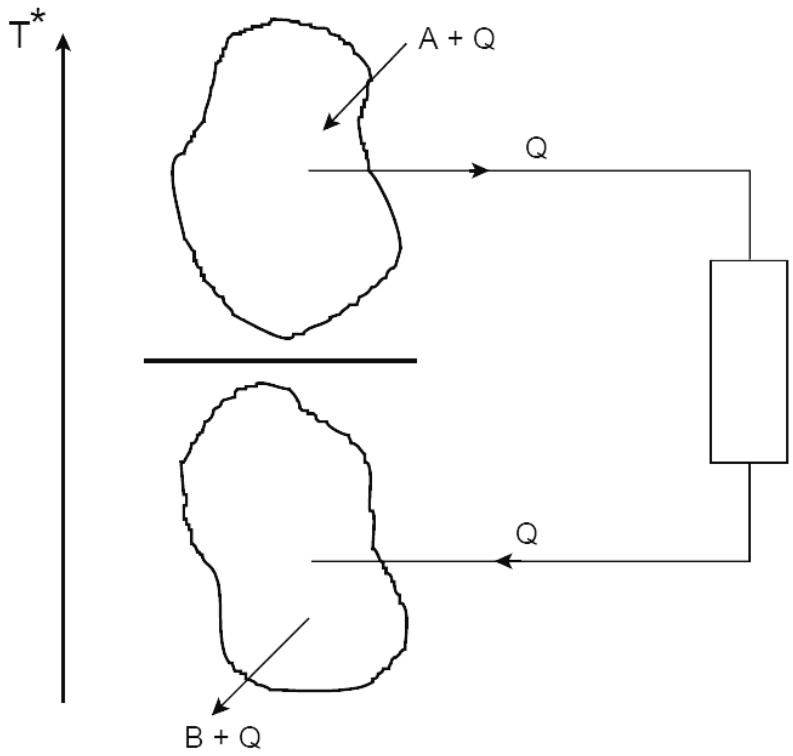
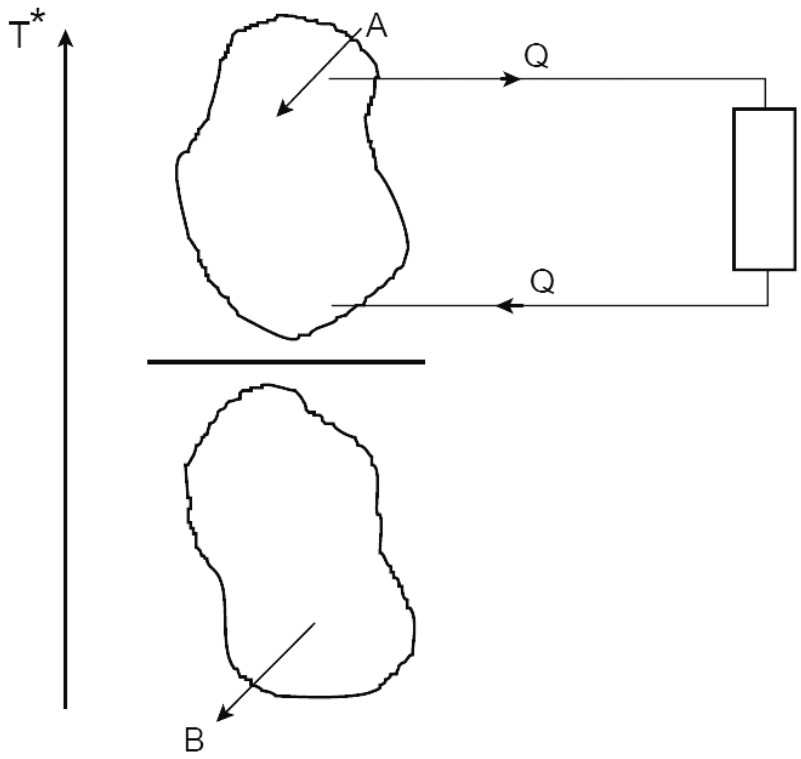
Where to put the distillation column? Above, below, or across pinch?

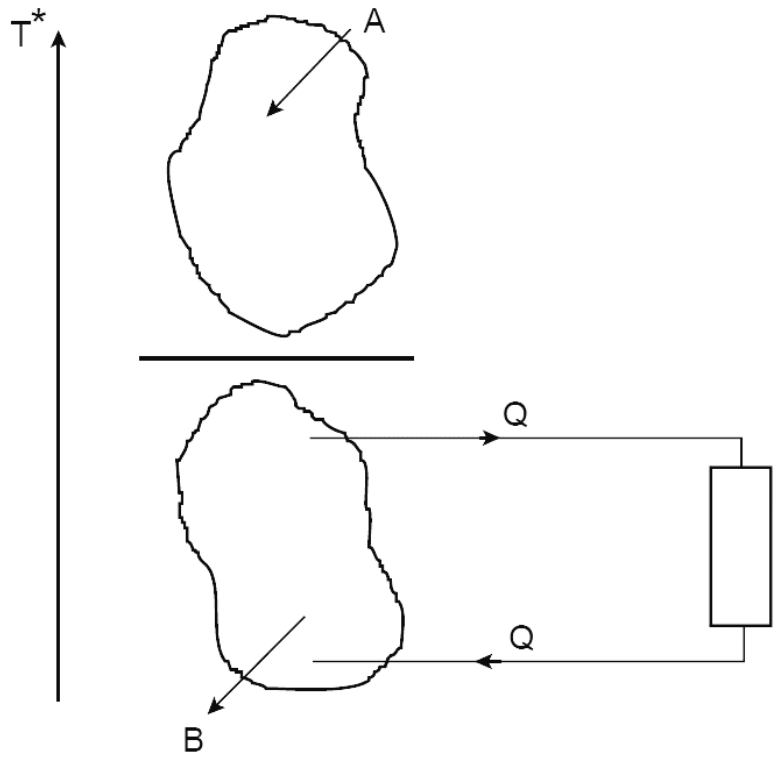
DISTILLATION COLUMN ACROSS THE PINCH



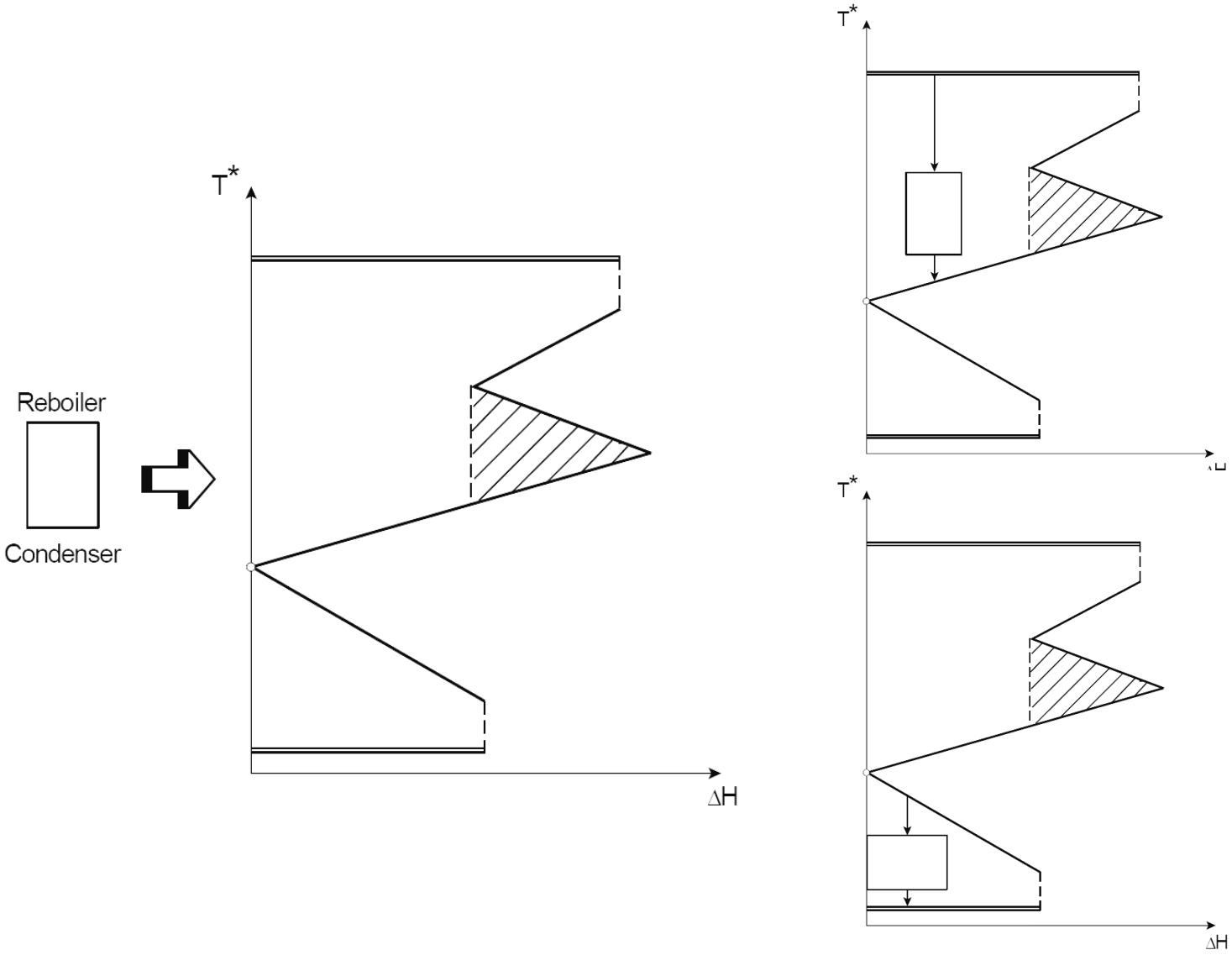
DISTILLATION COLUMN ABOVE THE PINCH



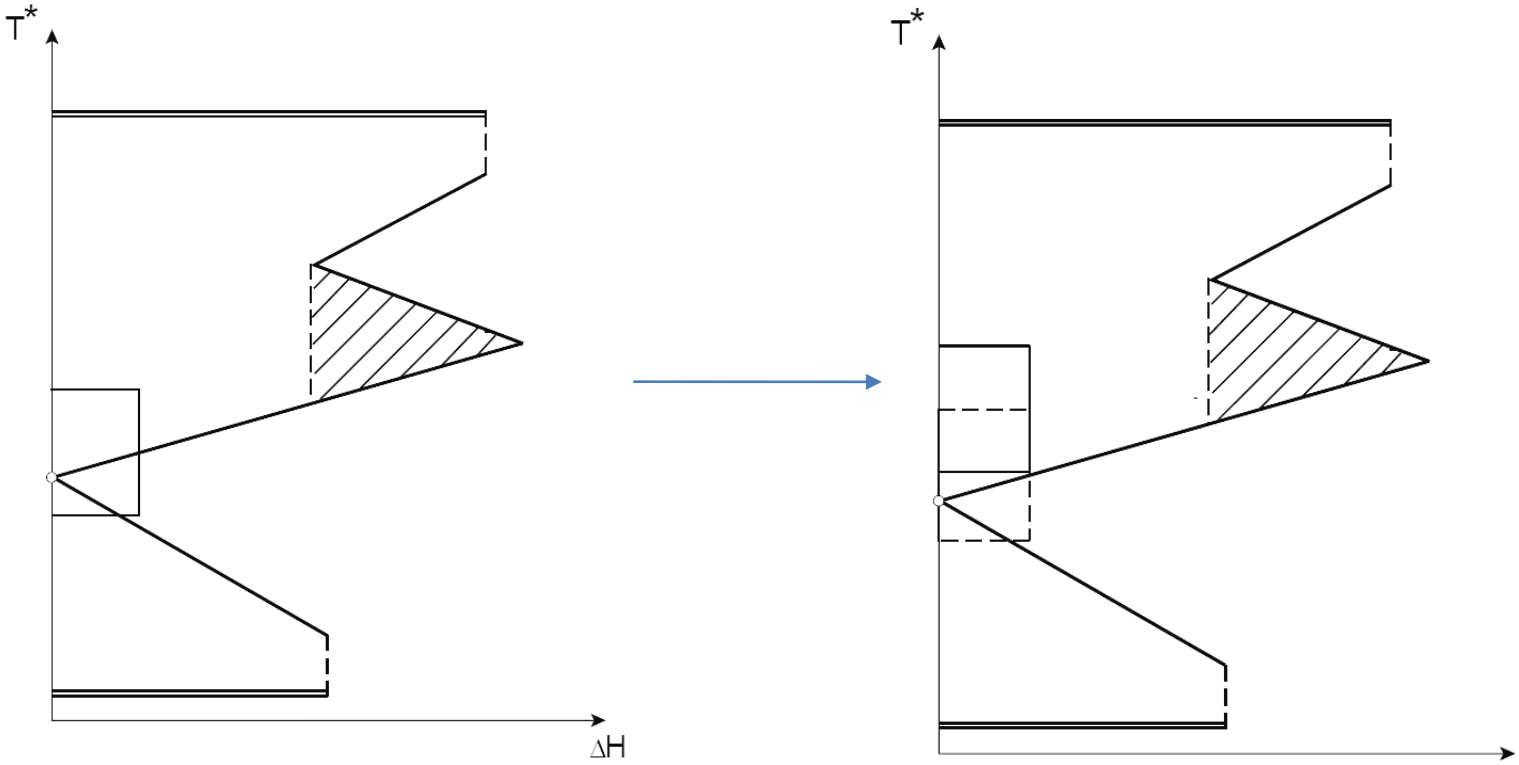
DISTILLATION COLUMN BELOW PINCH



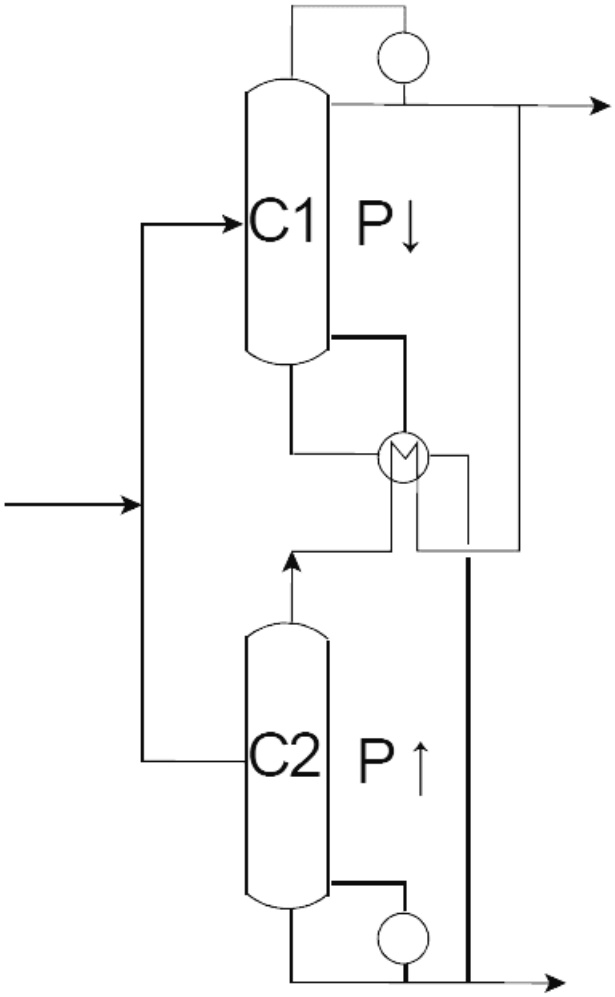
INTEGRATING COLUMNS INTO THE PROCESS

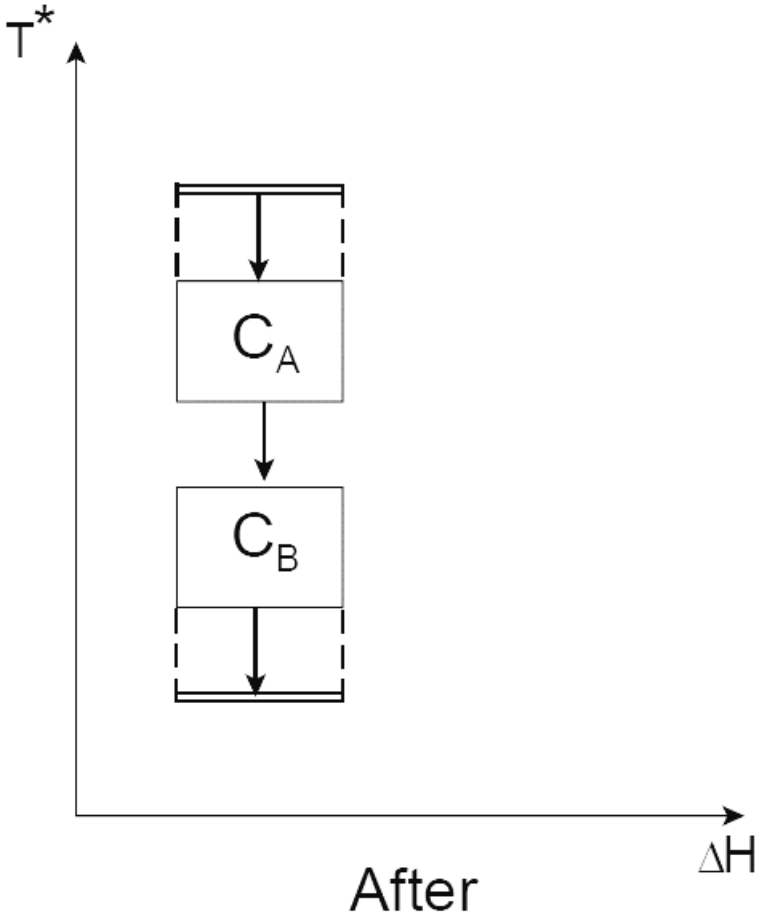


COLUMN ACROSS PINCH?



COLUMNS INTEGRATION

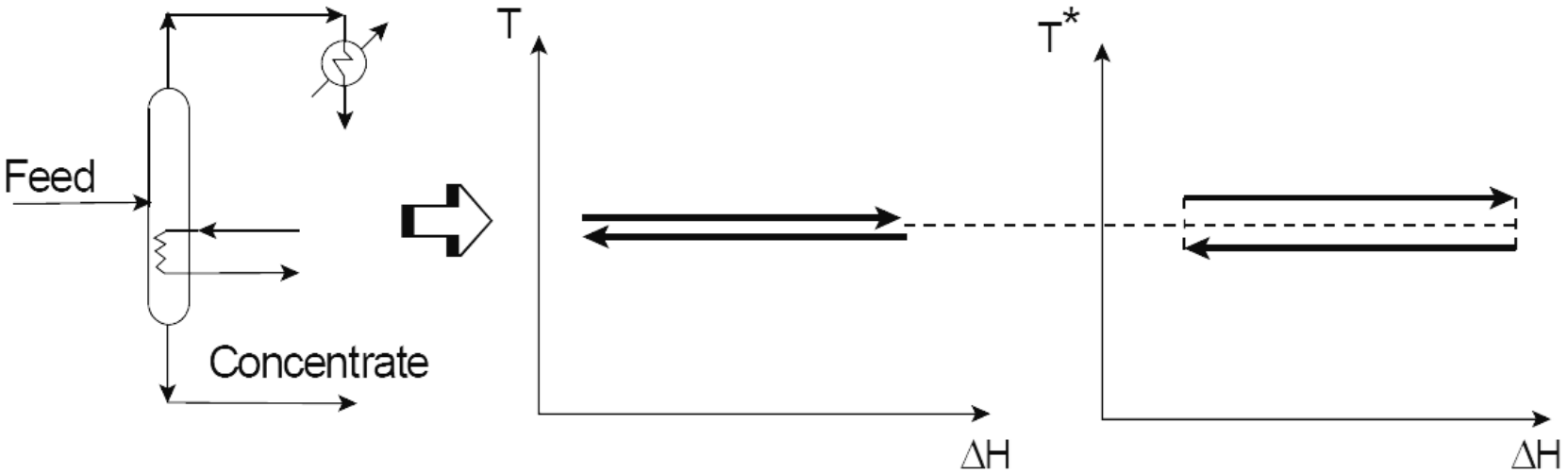




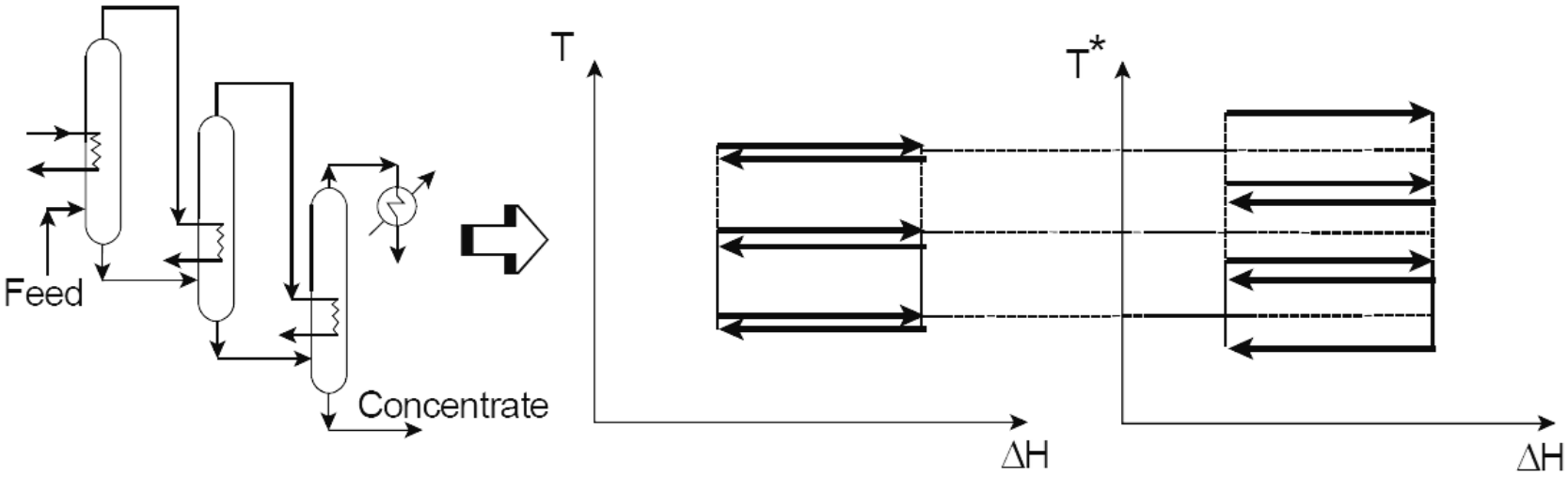
EVAPORATORS

Pair Test:

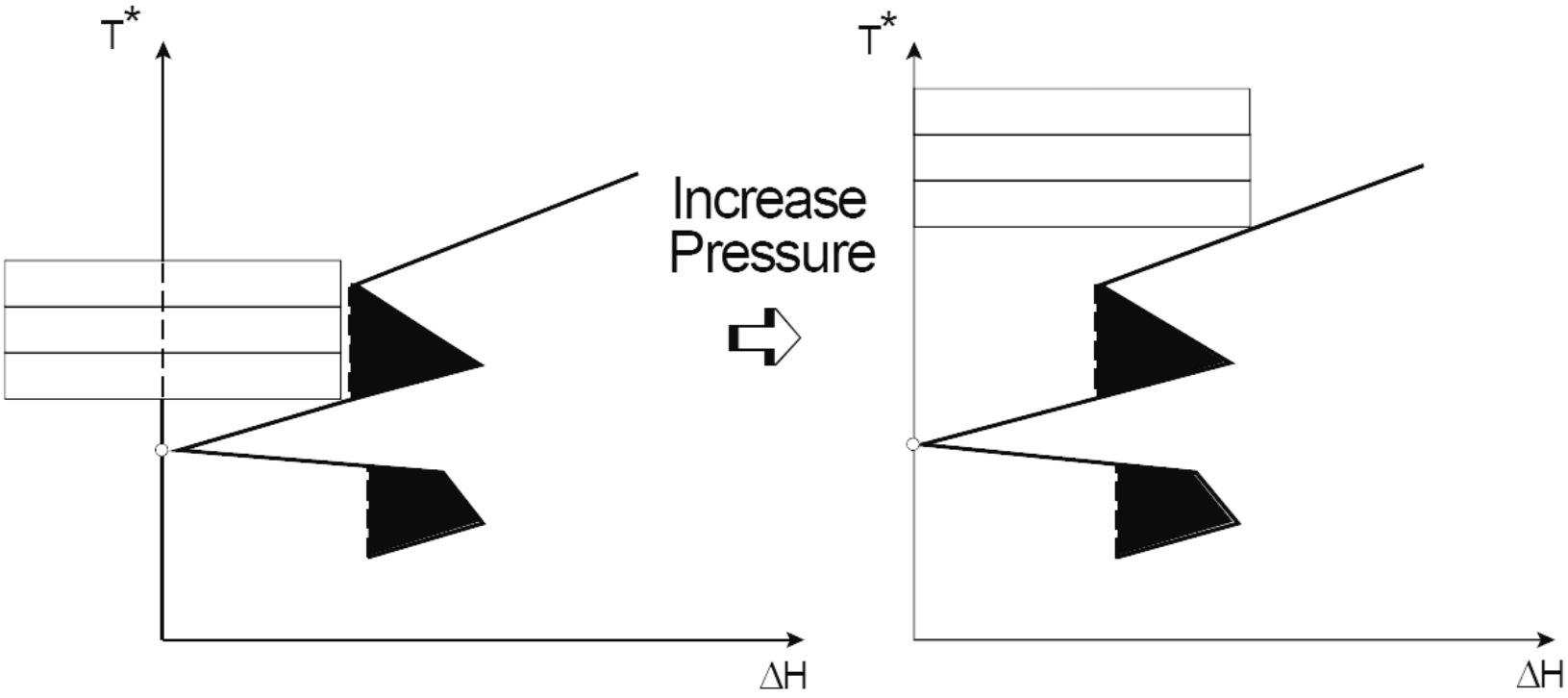
What is evaporator? When do you use them?



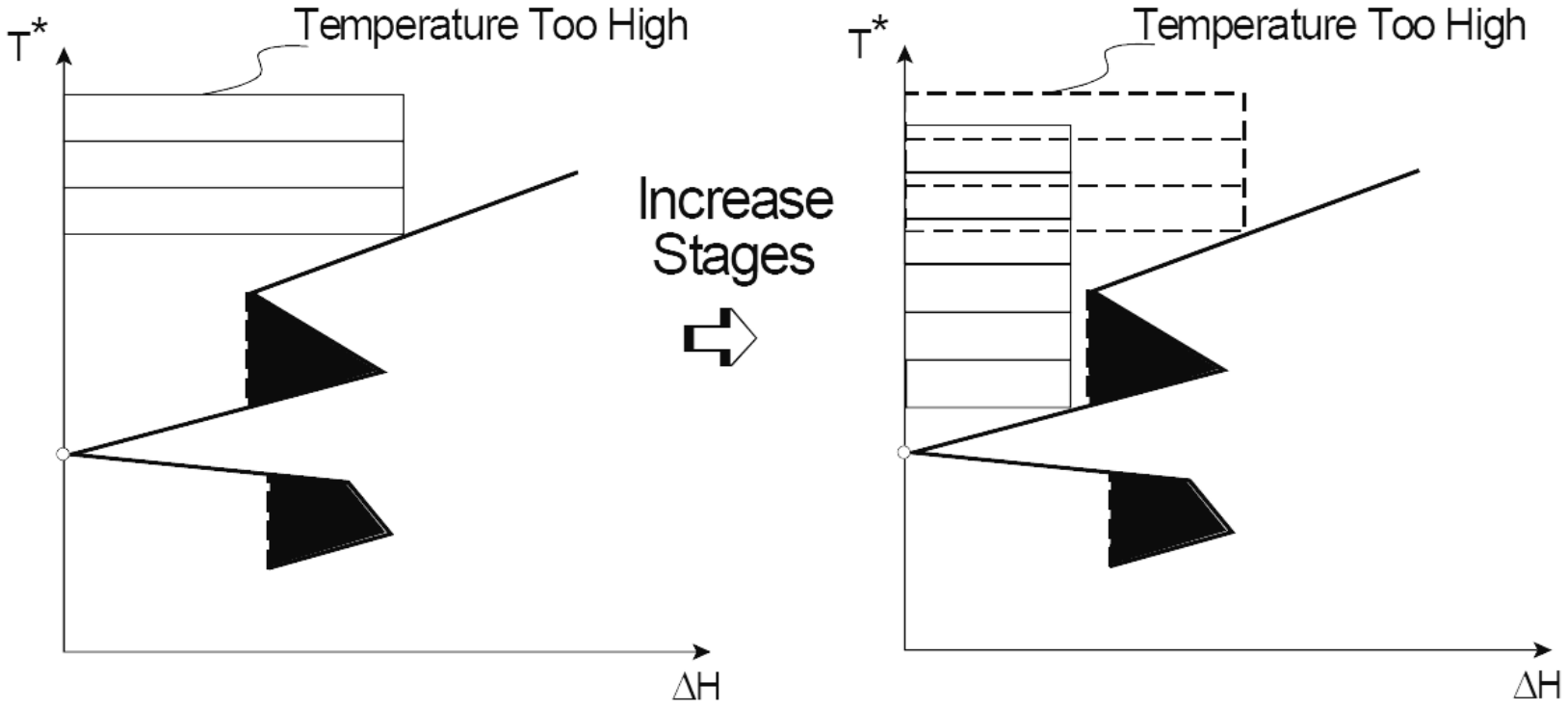
MULTI STAGE EVAPORATORS



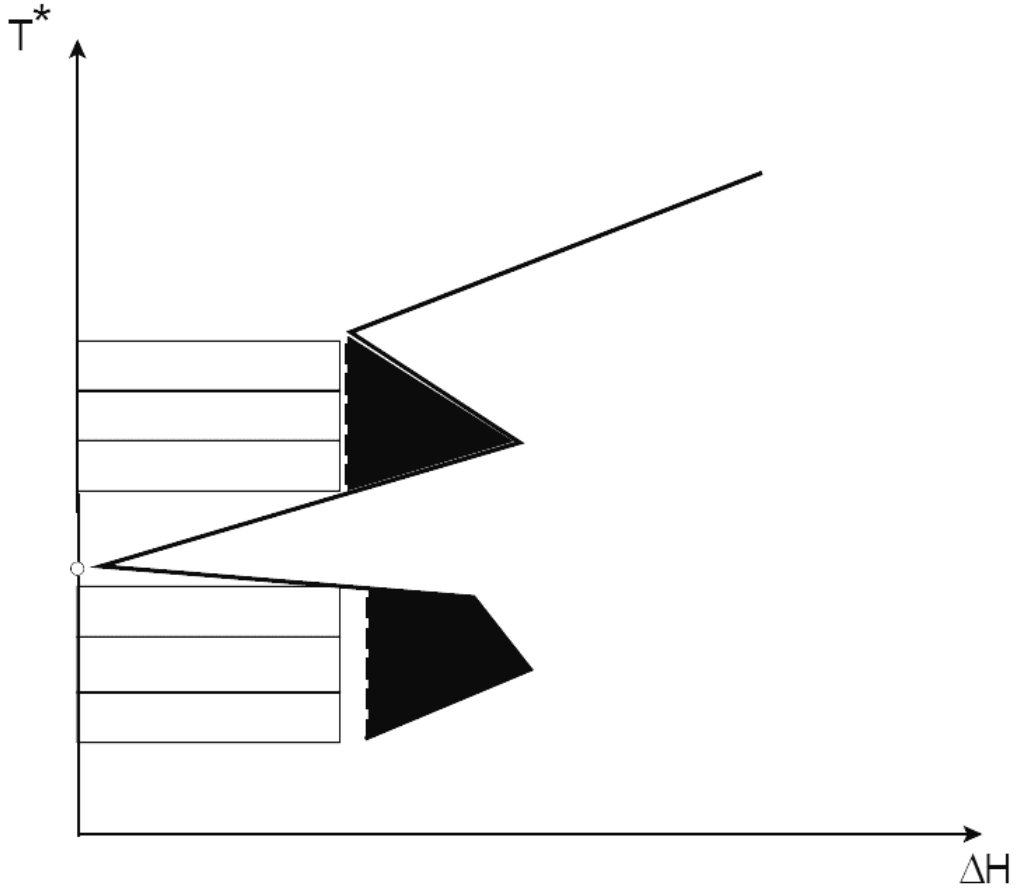
EVAPORATORS PLACEMENT (1)



INCREASING NUMBER OF STAGES



EVAPORATORS PLACEMENT (2)



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CHANGING LOADS

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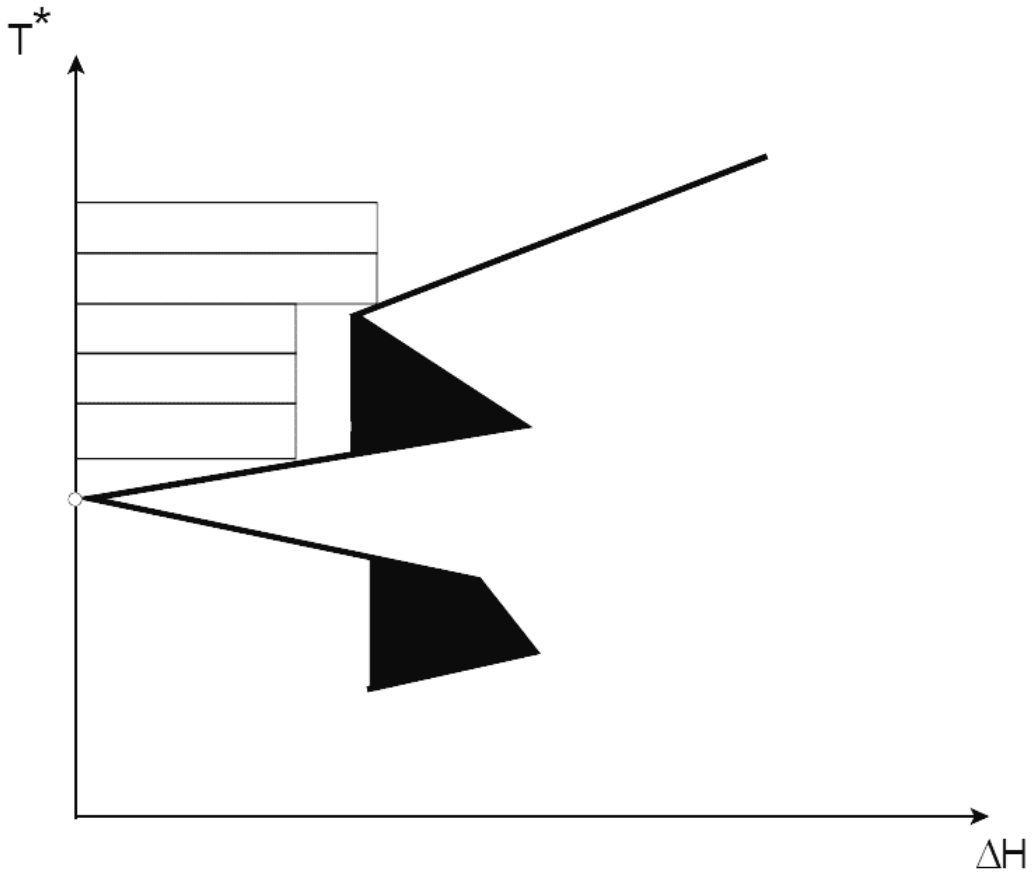
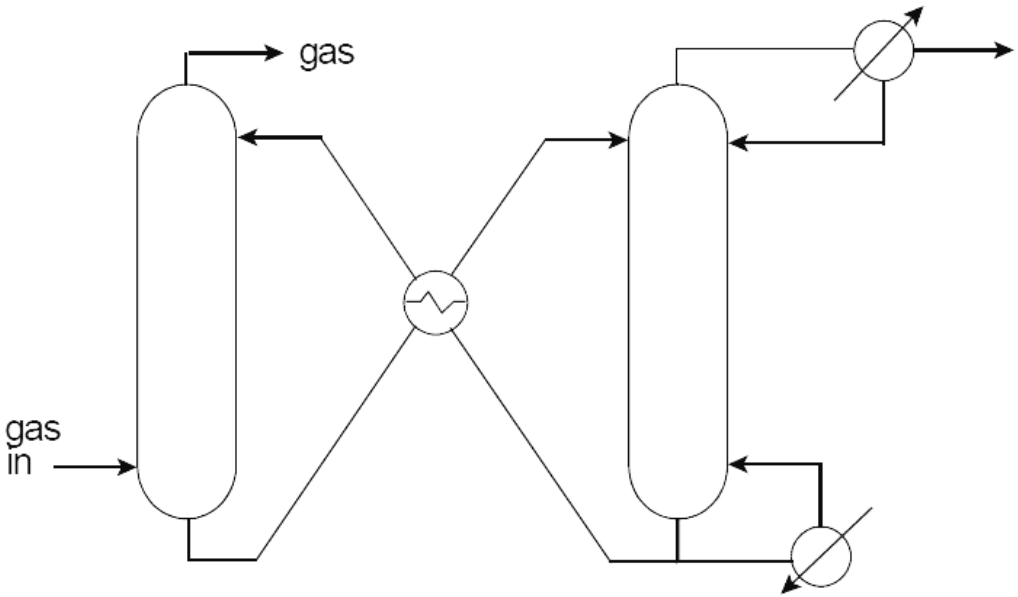
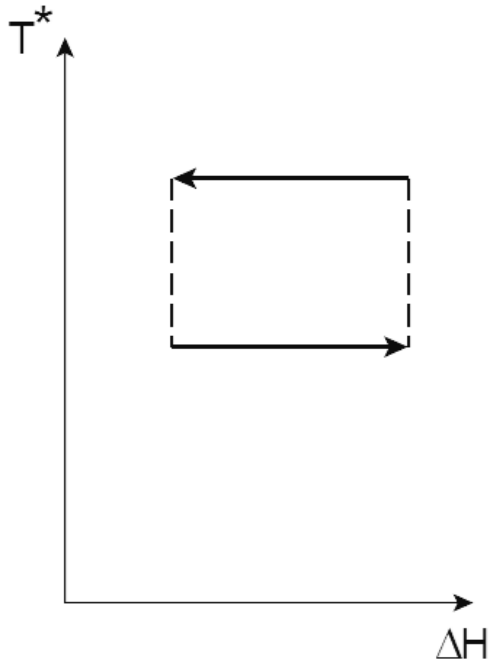
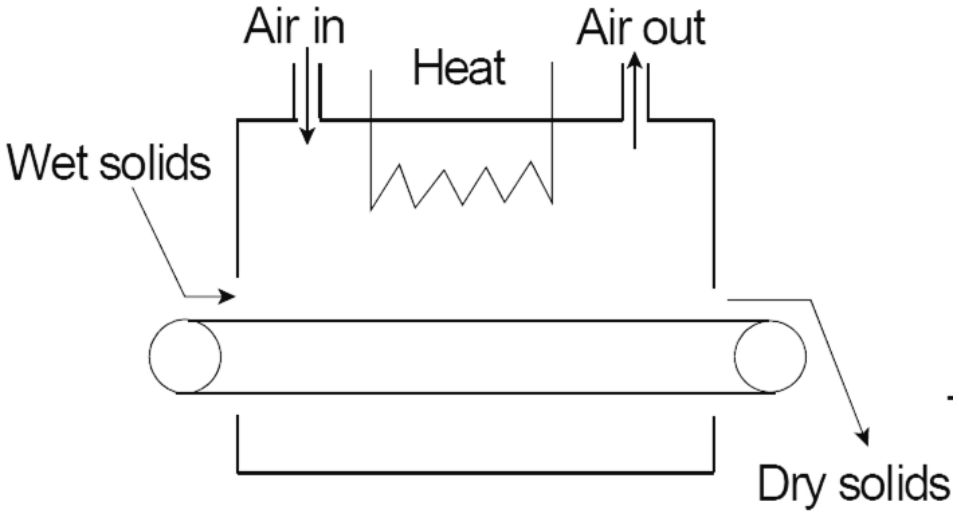


ABSORBER & STRIPPER





DRYERS



7 ways of reducing energy consumption of dryers:

- Reducing the inherent energy requirement for drying, e.g. by dewatering the feed
- Increase the efficiency of the dryer, by reducing heat losses, total air flow or batch times
- Heat recovery within the dryer system, between hot and cold streams
- Heat exchange between the dryer and surrounding processes
- Use of low-grade, lower-cost heat sources to supply the heat requirement
- Combined heat and power; co-generate power while supplying the heat requirement to the dryer
- Use of heat pumps to recover waste heat to provide dryer heating

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CLOSURE REVIEW

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What is the goal in implementing these process integration techniques? Explain it using the Grand Composite Curve (GCC)

Think about your income and expenses! Shout out any effort to optimally use your money

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GROUP WORK

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In your project,
Please locate the location of your distillation columns in the GCC
Can you change their operating conditions
to reduce the hot utility?

COURSE OVERVIEW