PROCESS INTEGRATION
Part 1: Heat Integration

Chapter 3:
Pinch Temperature

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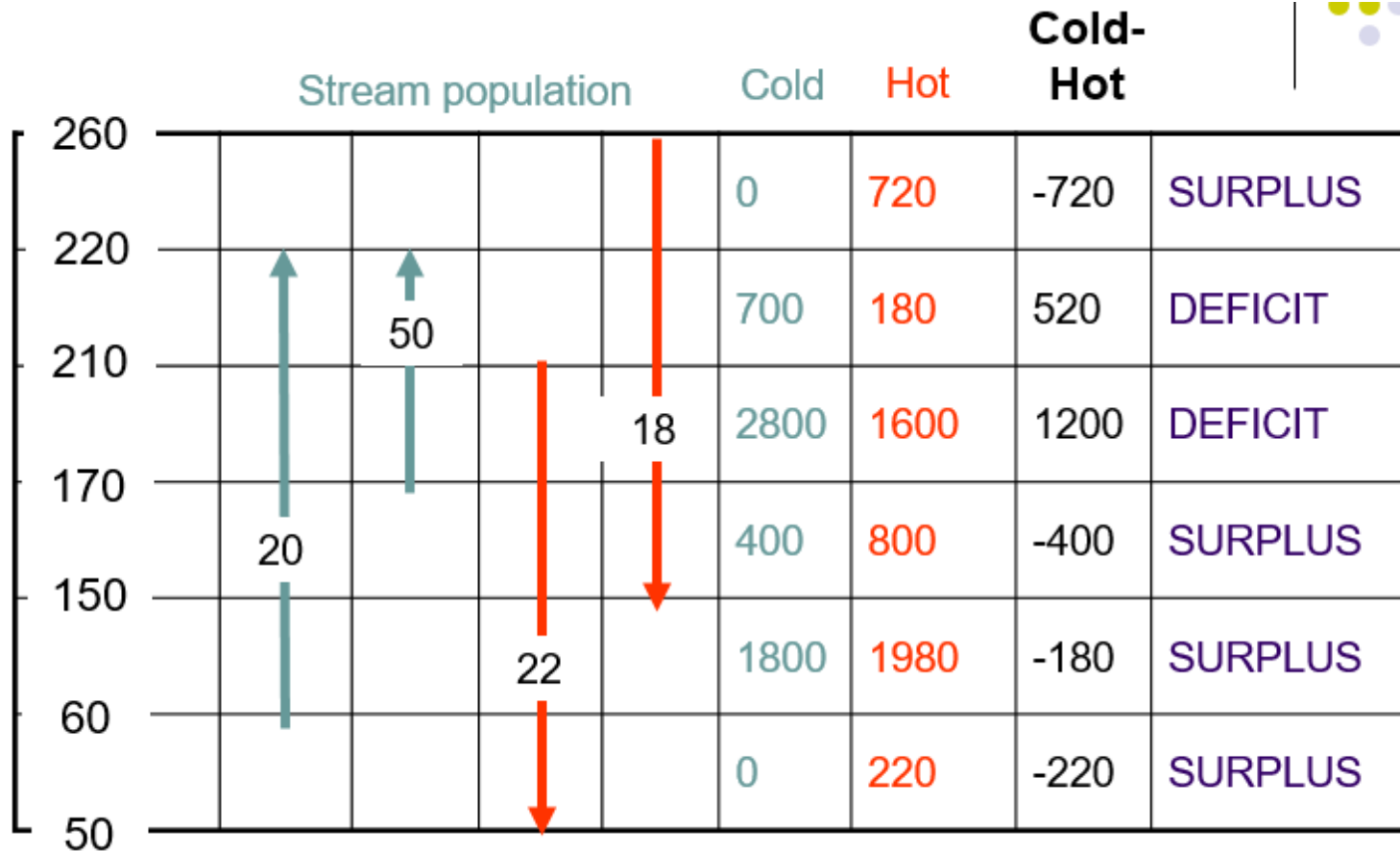ahisyam@ump.edu.my

Chapter Description

- Aims
  - To determine the pinch temperature

- Expected Outcomes
  - Students are able to determine the pinch temperature of existing process

In this lecture, we will learn how to determine the pinch temperature

From the cascade diagram

Stream population				Cold	Hot	Cold-Hot	
				0	720	-720	SURPLUS
				700	180	520	DEFICIT
				2800	1600	1200	DEFICIT
				400	800	-400	SURPLUS
				1800	1980	-180	SURPLUS
				0	220	-220	SURPLUS

20   50   22   18

260   220   210   170   150   60   50

Let's now construct the heat flow diagram

Hot utility

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260 - - - - - - - - - - - - - - - - - - **0** ◄─── Start from NO HOT UTILITY Qh = 0

-720

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220 - - - - - - - - - - - - - - - - **720**

520

210 - - - - - - - - - - - - - - - **200**

1200

Observe what happen........

170 - - - - - - - - - - - - - - - **- 1000**

-400

Principle:
Heat flow MUST NOT be negative.

150 - - - - - - - - - - - - - - - **- 600**

-180

There need an amount of heat/energy SUPPLIED to the system.

60 - - - - - - - - - - - - - - - **- 420**

-220

50 - - - - - - - - - - - - - - - **- 200**

How much?

Cold utility

Let's try to add hot utility by
1000 kW (the maximum negativity)
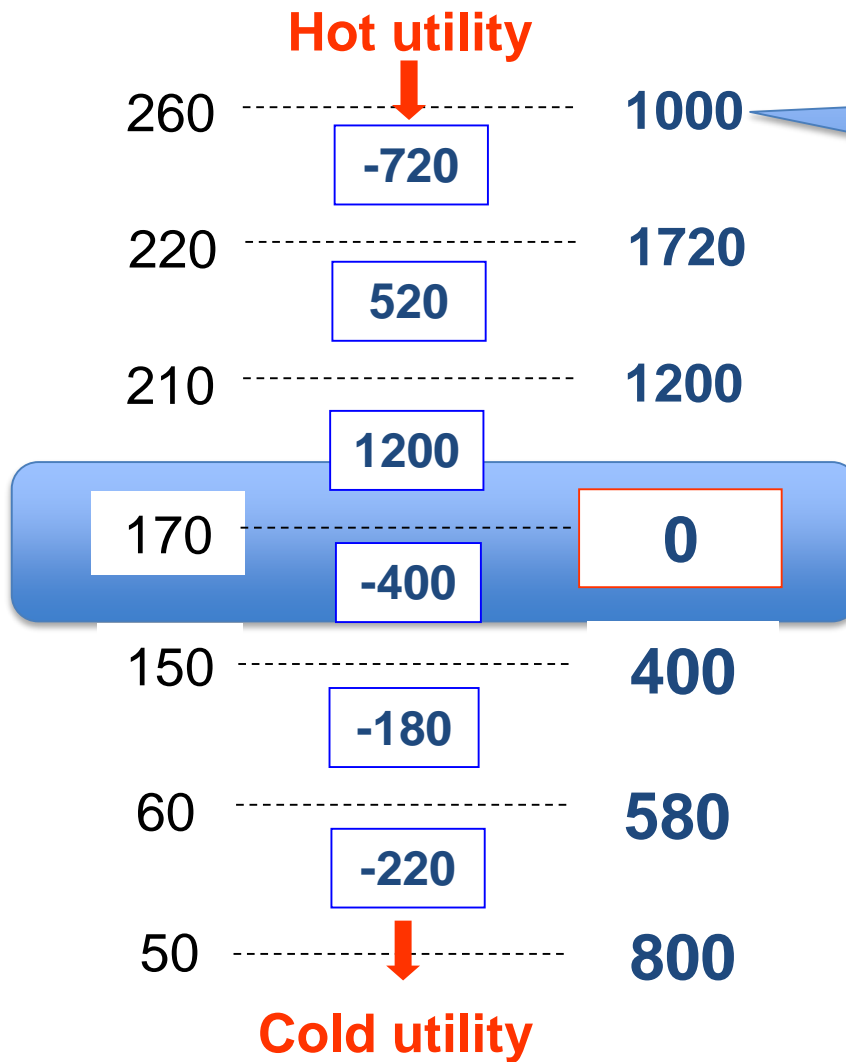
finally....
The PINCH POINT = 170 C

which means that

Hot PINCH Temperature = 170+½ΔTmin = 180

Cold PINCH Temperature = 170-½ΔTmin = 160

Thank you