Manufacturing Cost Estimation

(TBWS, 2nd Ed., Pages 72-74 & Chapter 5)

What is *manufacturing cost*?

Ongoing **money (cash)**

that is spent on producing a chemical

after **the plant is built.**

In the context of chemical process design.

Manufacturing Cost Contributions

Direct Costs	**Raw Materials** **Waste Treatment** **Utilities** **Operating Labor** **Supervisors** **Maintenance & Repairs** **Operating Supplies** **Laboratory Charges**
Fixed Costs	**Depreciation** **Local taxes** **Insurance** **Accounting** **Fire Protection** **General Engineering**
General Expenses	**Administration** **Sales** **Marketing** **R&D**
Accounting folks may adjust these categories somewhat at specific companies.	

Often ~70% of *COM*

Why take Chemistry courses? Why take Reactor Design? Why take Process Control?

~ Independent of scale !

COM = **Cost of Manufacturing**

COM_d = **Cost of Manufacturing without depreciation**

Cost Units

Manufacturing cost: **$/yr (sometimes $/kg)**

Capital cost: **$**

How is *COM* determined?

Cost *accountants* add up all the individual expenditures for ongoing production.

***Post*-spending analysis**

What we really want is a

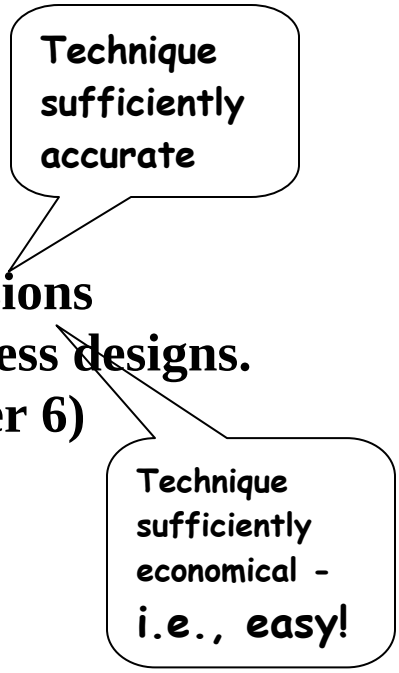
***Pre*-construction analysis**

i.e., before plant is even built

Assist the process design.

How is COM_d estimated?

We shall focus on one technique
that is suitable for assisting decisions
on selecting alternative process designs.
(TBWS, 2nd Ed., Chapter 6)



COM_d Estimation - Two Parts

Part 1
Estimating major cost contributions

Symbol	Cost Component	Estimation Approach
C_{RM}	Raw Materials	PFD coupled with vendor price quotes[1]
C_{WT}	Waste Treatment	PFD coupled with vendor price quotes or internal cost figures[2]
C_{UT}	Utilities	PFD coupled with current utility unit costs at plant location[2]
C_{OL}	Operating Labor	PFD coupled with current labor practices and costs at plant location[3]
FCI	Fixed Capital Investment	Refer to Capital Cost estimation techniques[4]

[1] *Chemical Market Reporter* is a preliminary source for material prices.

[2] TBWS Table 6.3 provides typical utility costs and waste treatment costs.

[3] TBWS Eq. (6.3) provides estimation method.

[4] TBWS Chapter 5 and CAPCOST.xls on CD.

Part 2

Estimate everything else!

$$COM_d = 0.180\,FCI + 2.73\,C_{OL} + 1.23\,(C_{UT} + C_{WT} + C_{RM})$$

TBWS, 2nd Ed., Eq. (6.2)

Your Next Steps for Learning – Some Suggestions

a. Review Example Application -

Hydrodealkylation (HDA) Process in TBWS
Operating Labor – Example 6.2
Raw Materials – Example 6.8
Utilities – Example 6.10
Summary – Example 6.10

b. Use CAPCOST on TBWS CD

Utilities Summary spreadsheet
COM Summary spreadsheet

c. Refer to TBWS CD for instruction video.

TBWS Example 5.14 and Table E4.14b extended to COM_d
TBWS Example 8.1

d. Refer to solution for TBWS Problem 6.1