CHAPTER 4

PROGRAM DESCRIPTION

4.1 Program description

Optimization design for parallel cyclones having a tangential gas inlet program can simulate 6 types of cyclones, 5 standard cyclone types and a user cyclone type. The user can select to calculate only one or any combination of these cyclone types, and the program will calculate only the selected types.

There are 3 parts in this programs as follow:

4.1.1 Input data

4.1.2 Calculation

4.1.3 Result display.

To run this program, insert the diskette containing **cyc_dsn.exe** in drive A and type **a : cyc_dsn.exe** then press **Enter**

At this point the program is ready for inputting the data. (The help menu is available on-line by pressing **Alt_h**)

4.1.1 Input data. From main menu there are four types of data that the user has to input into the program and they are cyclone types, operating conditions, cost and thickness, and calculation Overall Efficiency. Each type of data is detailed as follow:

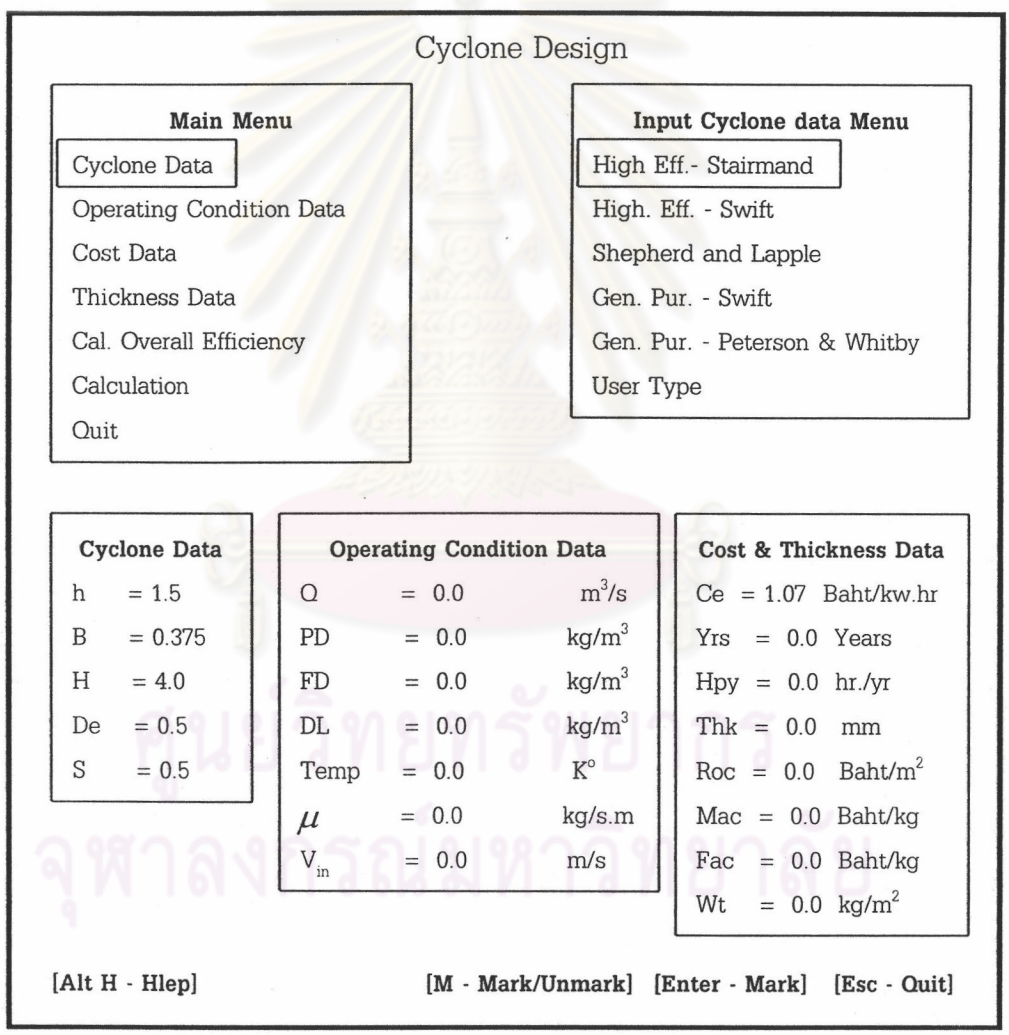
4.1.1.1 Cyclone types. At highlight bar when any standard cyclone is selected by press "**M**" for mark or unmark the selection, its configuration will be loaded automatically, but for the user cyclone type the user must input the cyclone configuration K, cyclone diameter D in meter, and the amount of cyclones AC. The following is a list of the cyclone types:

- Stairmand type (High Efficiency)
- Swift type (High Efficiency)

- Shepherd and Lapple type
- Swift type (General Purpose)
- Peterson and Whitby (General Purpose)
- User type

On screen details for input Cyclone types data as following Fig. 4.1

Fig. 4.1 On screen show for input Cyclone data



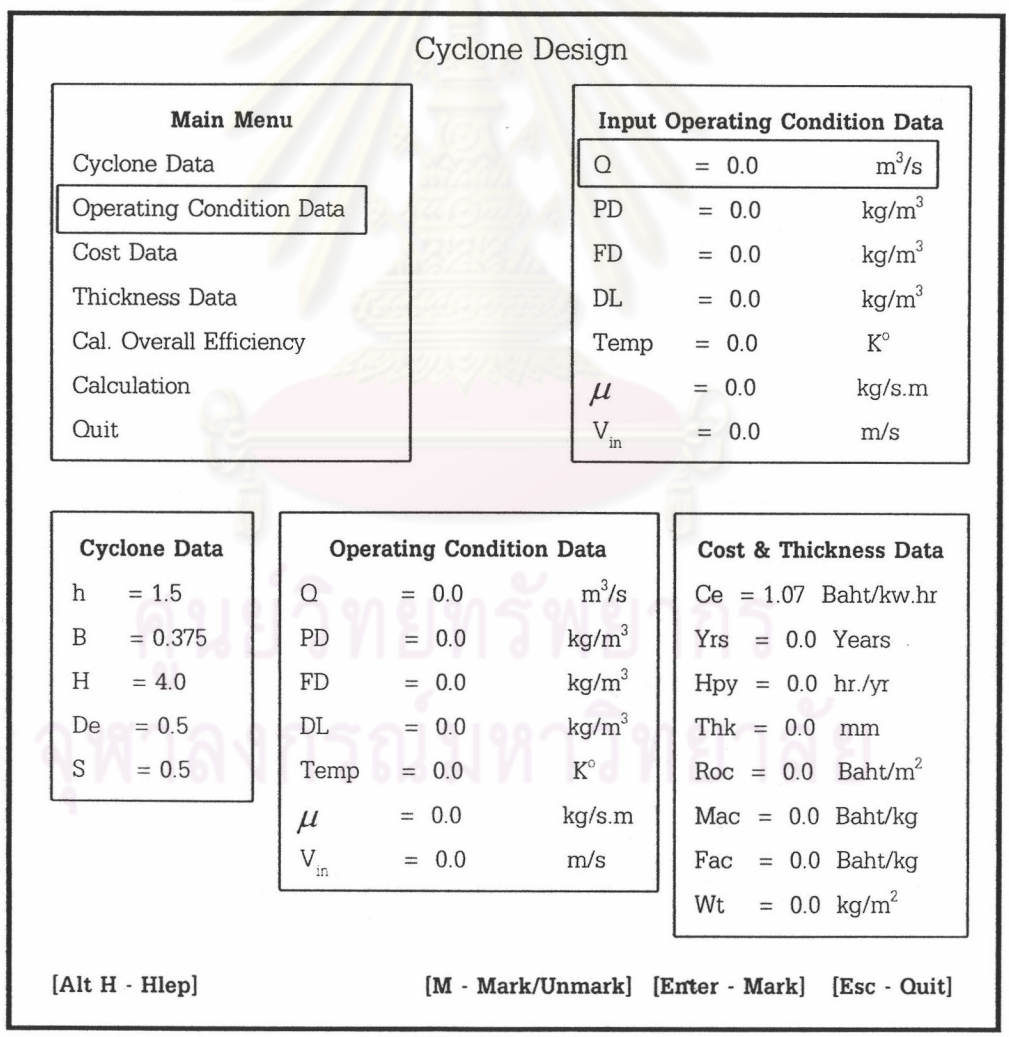
4.1.1.2. Operating condition data

- Gas volume flow rate, m^3/s; Q
- Particle density, kg/m^3; ρ_p

- Fluid density, kg/m^3; ρ
- Dust loading, kg/m^3; DL
- absolute temperature, K$^\circ$; T_1
- fluid viscosity, kg/m.s; μ
- required cutsize particle diameter, m; d_{cpr}
- Inlet velocity, m/s; v_i

On screen details for input Operating condition data as following Fig. 4.2

Fig. 4.2 On screen show for input Operating condition data



4.1.1.3. Cost and Thickness data

- power rate, Baht/kw.hr; c_e
- amount operating years, year; *yrs*
- operating hours per year, hr/yr; *hpy*
- steel thickness, mm; *Thk*
- steel rolled cost, Baht/m^2; *Roc*
- steel cost, Baht/kg of steel; *Mac*
- steel weight, kg of steel/m^2; *Wt*

On screen details for input Cost and Thickness data as following Fig. 4.3 - Fig. 4.4

Fig. 4.3 On screen show for input Cost data

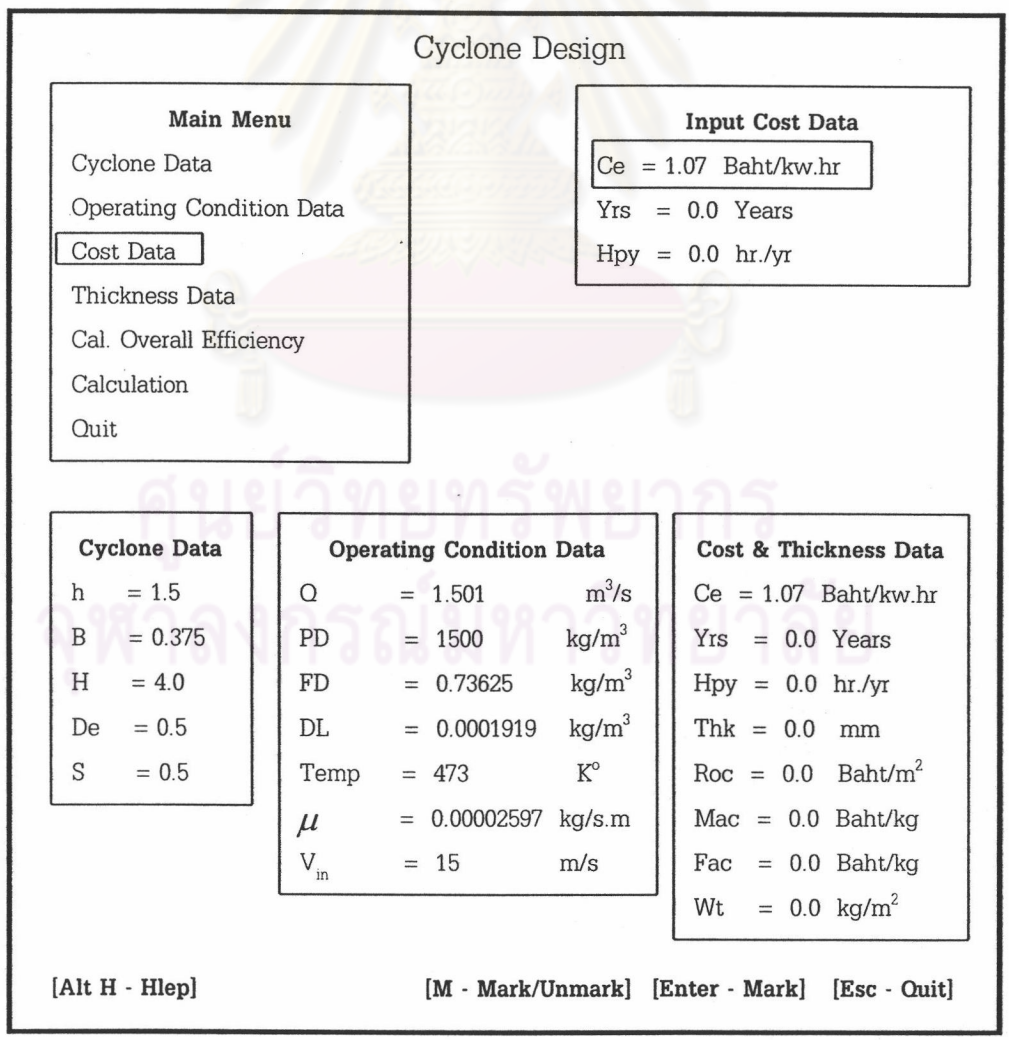
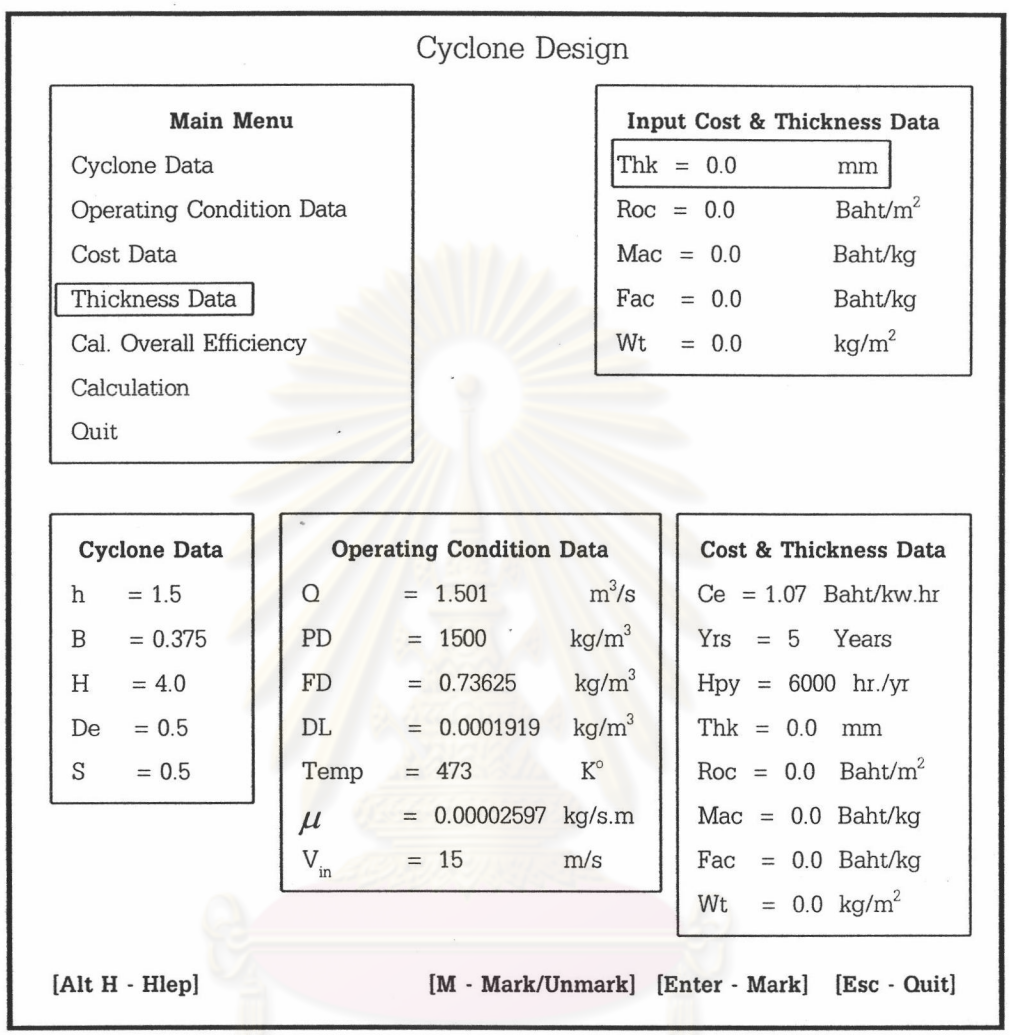


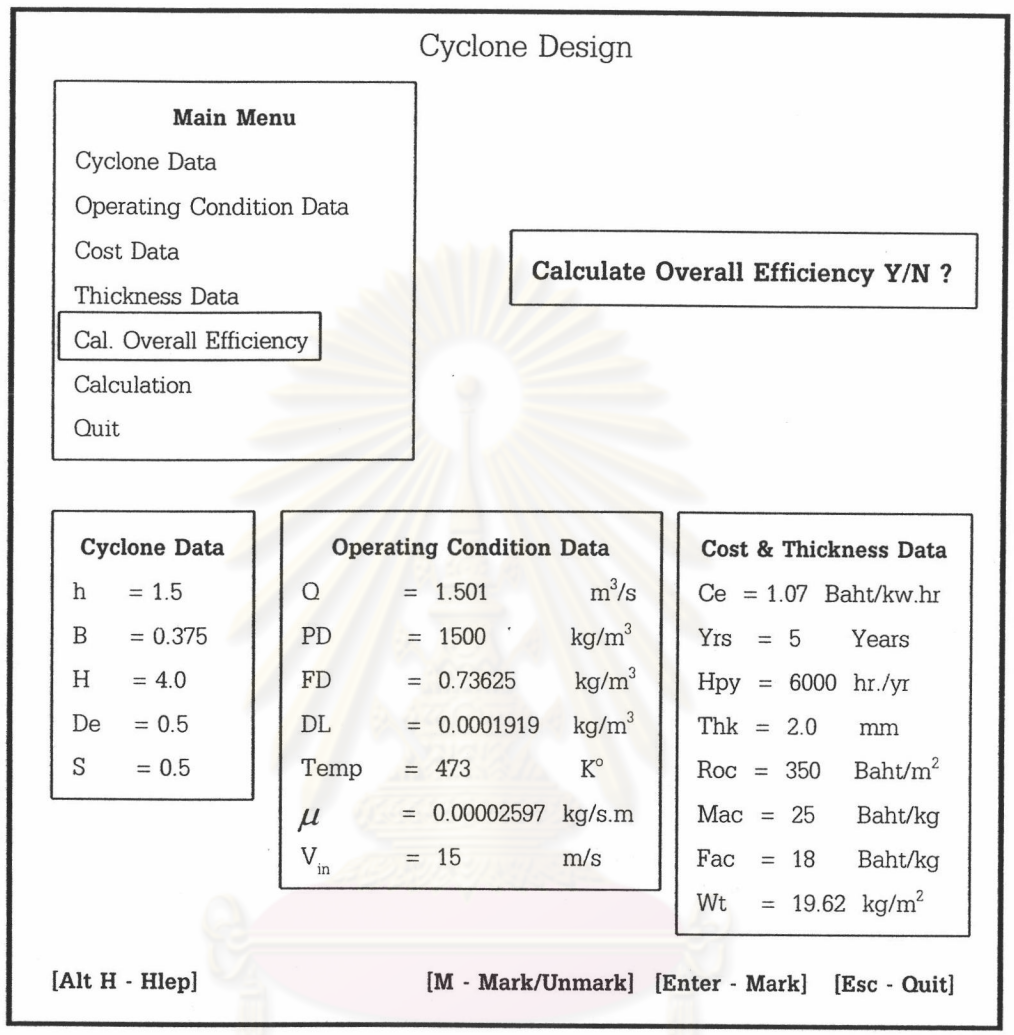
Fig. 4.4 On screen show for input Thickness data



4.1.1.4. Calculation Overall Efficiency data. This calculation is optional. The user can select or neglect this calculation. If the user chose to neglect this calculation, press "**N**," and the program will not calculate the Overall Efficiency of that cyclone type. If the user chose to calculate the Overall Efficiency, press "**Y**," and then input the mass of dust at each particle diameter range m_i in gram.

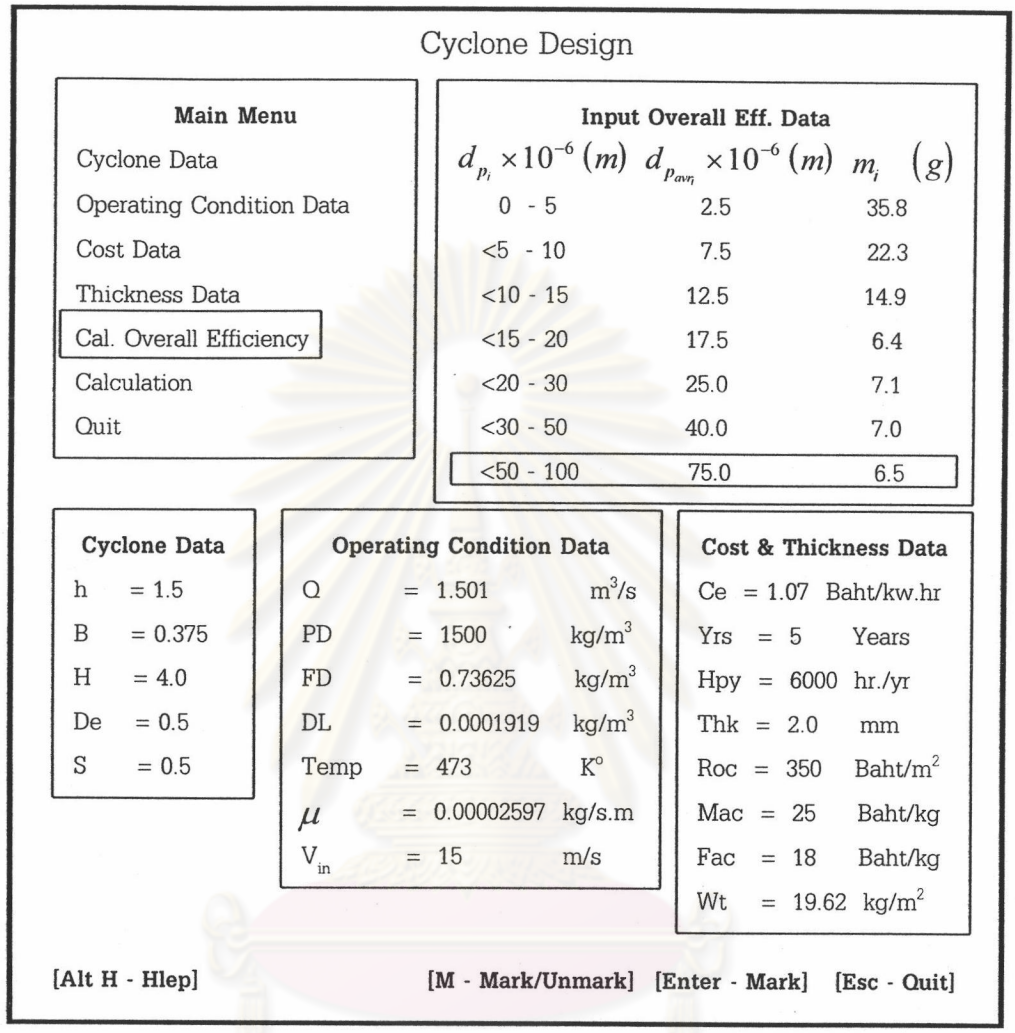
On screen details for select and input Overall Efficiency data as following Fig. 4.5 - Fig. 4.6

Fig. 4.5 On screen show for select to calculate Overall Efficiency data



If the user chose to calculate the Overall Efficiency, by press "**Y**," and then input the mass of dust at each particle diameter range m_i in gram at highlight bar. On screen detail as the following Fig. 4.6

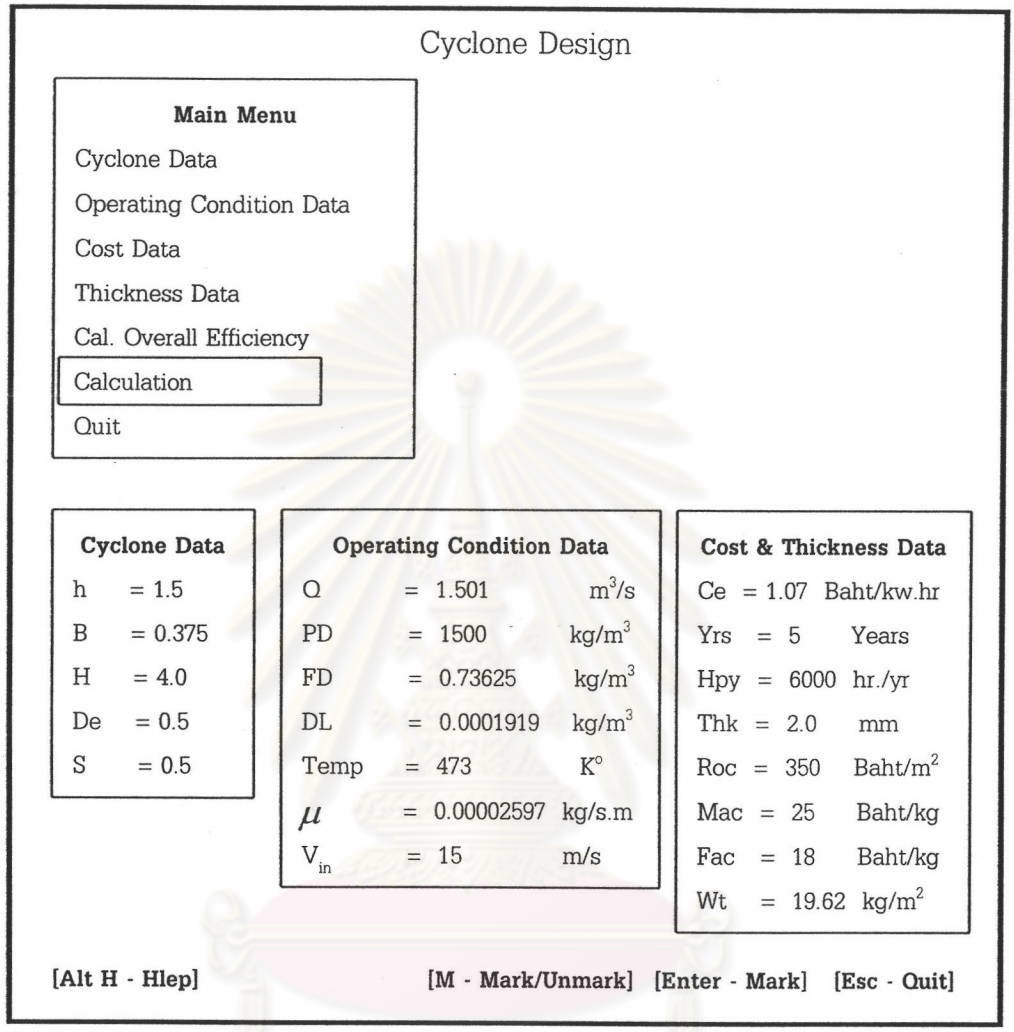
Fig. 4.6 On screen show for input Overall Efficiency data



4.1.2 Calculation. From main menu User can calculated all selected application by press '**Enter**' at the Calculation highlight bar.

On screen details for Calculation all selected application as following Fig. 4.7

Fig. 4.7 On screen show for Calculation all selected application



4.1.3 Result display. At the end of calculation the program print out the optimized solution and the following details of each cyclone type.

cyclone types (user selected types only)
amount of cyclone; N
cyclone diameter, m; D
pressure drop, N / m^2; ΔP
50% *cutsize particle diameter*, m; $d_{cp_{50}}$
cutsize particle diameter, m; d_{cpr}
objective value; Obj

$$total\ fixed\ \text{cost}, baht; C_{fixed}$$
$$total\ operating\ \text{cost}, baht; C_{oper}$$
$$total\ \text{cost}, baht; C_t$$

End.

User can exit the program by press **'Quit'** at highlight bar from main menu. On screen detail as Fig. 4.8

Fig. 4.8 On screen show for Exit program