

SHELLFLO a new Gateway to PHOENICS

Most shell-and-tube heat exchangers, throughout the world, are designed by means of computer programs which, to CFD specialists, appear to be rather primitive. Thus, instead of calculating the true pattern of flow within the shell, they make presumptions about which are based on proposals made by T. Tinker in 1958, namely that the pattern can be characterised as consisting of the 4 streams (A, B, C and E) shown in the following diagram.

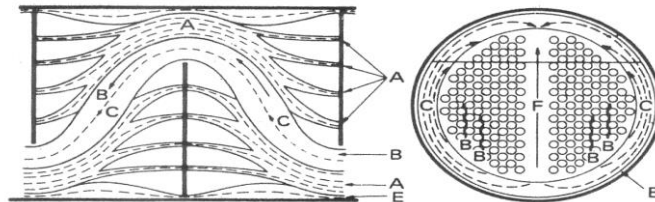


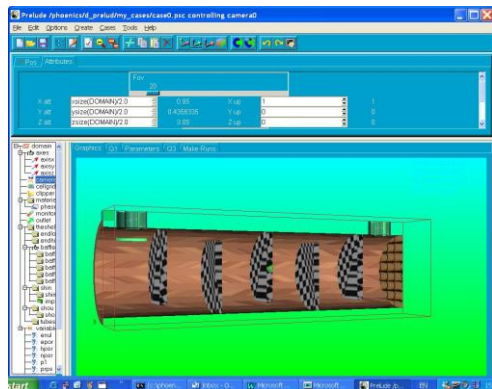
Figure 1 Schematic flow distribution diagram for baffled shell-side flow. Based on Tinker [14].

Whether or not this presumption suffices for the prediction of heat transfer rates (probably not, as CFD specialist suppose), it certainly does not provide answers to questions asked by many designers, such as:

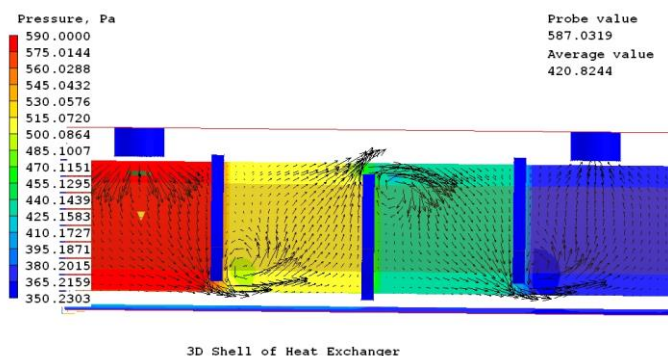
- At what locations are the highest cross-flow velocities to be found (where tube supports may be required to prevent vibration and mechanical failure)?
- Where are the velocities likely to be so low that deposits may settle and cause 'fouling'?
- How can the flow pattern be favourable influences by the proper placing of impingement plate or changing the 'cut percentage' of the baffles?

Answers can now be provided by a new PHOENICS Gateway called SHELLFLO,

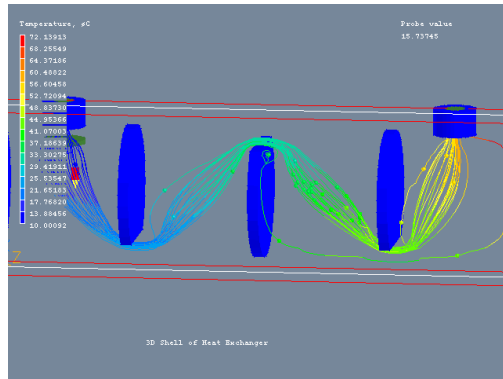
The user interface of SHELLFLO is shown here. Its main structure is that of PRELUDE; and of course it sends its output to be processed by the solver (EARTH) and VR-VIEWER modules of PHOENICS.



However its users require no CFD knowledge; and only minimal acquaintance with PHOENICS; for the SHELLFLO Gateway presents its user with only the items which its user understands: Inlets, outlets, tube bundles, baffles, impingement plates etc.



The results of the PHOENICS Calculation can be presented to inexperienced users graphically by way of macros; but, aided by tutorials, new users soon find that they can extract from them the information which interests them, whether pressure distribution and velocity vectors as above or animated streamlines as below.



SHELLFLO is supplied by CHAM as a stand-alone single-purpose predictive tool, designed solely to assist heat-exchanger designers. The cost of a perpetual licence is competitive with any other similar single-purpose software.