

# **REDUCTION OF FOULING IN FALLING-FILM EVAPORATORS BY DESIGN**

Ken R Morison

*Department of Chemical and Process Engineering, University of Canterbury, Private Bag 4800, Christchurch, New Zealand*

## **ABSTRACT**

*Falling-film evaporators are widely used for the concentration of liquid foods, especially milk prior to spray drying. Given that an evaporator is a heat exchanger, it is often assumed that fouling is similar in heat exchangers and evaporators. This paper describes a number of features of falling-film evaporators that have been studied in recent years, and hence it seeks to show that attention to design detail should lead to lower rates of fouling.*

*Typically fouling is due to poor liquid distribution to the tubes, which leads to drying of the milk films, or causes increases in viscosity to the point where flow stops. The minimum flow rates required to ensure wetting of tubes and flow into the tubes have been established but distributor holes must be correctly sized and drilled to give equal flow to all evaporator tubes. Blockage of distributor holes during operation can be avoided by installation of filters. Vapour flows from flashing or from unequal evaporation in the multiple passes of the same effect can interfere with the liquid flow from distributor plates but this can be overcome by the installation of vapour tubes in distributor plates.*

*When correctly designed and fabricated, it is likely that falling film evaporators can operate in excess of 20 hours without excessive fouling or bacterial growth.*