

likely to impact wash efficiency since the deliquored cake will contain some low resistance pathways for the wash to take. Furthermore, the opportunity for deliquoring to remove the wash is very limited. Uniform delivery of the wash to the cake is also potentially challenging since the rate of wash delivery *via* an atomiser/spray bar is likely to differ along the axis of the drum. Containment of vacuum drum filters is relatively straight forwards and operation can be automated.

### 13.6.2 Belt Filtration

There are some similarities in the challenges faced by belt and drum filters. The problem of cake cracking in this case is linked to the movement of the belt; minimising flexing of the cake is essential to the efficiency of washing which may be impaired both by having to wash a partially deliquored cake and through cake cracking associated with flexing of the cake. Optimising the belt velocity and suspension feed rate allows the cake thickness to be controlled; the optimum distance from the suspension feed to the wash feed can be set based on the degree of deliquoring which is deemed acceptable. The wash feed rate and wash zone length can then be adjusted based on the level of purification required. There is the possibility of reducing wash solvent consumption by adopting counter current washing in which fresh wash solvent is added at the end of the wash zone, the collected slightly contaminated wash then being fed back to an earlier point in the wash sequence, collected and applied even earlier in washing. If this approach is adopted, then the procedure outlined above to investigate appropriate wash compositions can be adapted to address the compositions likely to be encountered in such a counter current washing process. The length of the active washing area along the belt can be greater than for drum filters which may be another advantage, and it is possible to introduce multiple washing steps including wash solvent switches, again something which is very challenging to accomplish on a small drum filter. The final advantage of belt filters is that it is relatively easy to wash the belt after product discharge. Disadvantages include relatively complex mechanisms associated with the moving belt which make cleaning verification for product switchover challenging. In addition, there is greater technical complexity associated with containment. A useful concept which facilitates efficient operation is the Indexing Belt Filter.

### 13.6.3 Semi Continuous (Sequential Batch Filtration)

In principle this could be represented by a pair of filter dryers operating sequentially in parallel but the resulting relatively infrequent discharge may not be accepted as a continuous process. However, if the number of filter units is increased and the operation automated to deliver a substantially increased frequency of discharge this becomes a continuous process. This approach can combine the flexibility of conventional batch