

Classification model for predictive maintenance of small steam sterilisers

ABSTRACT

With 35,000 small steam sterilisers in the German market, after-sales service and maintenance are critical issues for manufacturers and distributors. At present, preventive maintenance is one of the most commonly-implemented maintenance strategies. However, with an average failure probability of 10%, ~3500 autoclaves require unplanned repair per year, causing customers' business interruptions and increased maintenance costs. From the authors' observation, a predictive failure detection mechanism is needed to prevent failures and reduce the significant safety risk. Hence, this study proposes a predictive maintenance mechanism for small steam sterilisers. The predictive maintenance mechanism is constructed from classification models that categorised the health condition of two critical components in small steam sterilisers, i.e. a vacuum pump and a steam generator. The classification models were built from multisensory data, obtained from 1000 protocol records of CertoClav Vacuum Pro steam sterilisers. They perform exploratory experiments to find a suitable classification model. This study found that the random forest algorithm performed best in terms of accuracy for both the vacuum pump and steam generator data sets (83.5 and 82.0%, respectively). They also found that the features related to the pre-vacuum stage profoundly influence the condition of the vacuum pump and the steam generator.