



## Introduction to Maintenance Programs

**A planned and documented approach to the ongoing maintenance of the dairy factory environment and manufacturing equipment provides a number of benefits. It not only reduces the likelihood of equipment failure during critical processing operations, but also ensures that possible contamination of product from faulty machinery or deteriorating factory environments is minimised.**

All dairy manufacturing premises within Victoria are required by legislation to comply with the 'Code of Practice for Dairy Food Safety.' Dairy manufacturing premises and equipment must be designed, situated, constructed and maintained in a manner that prevents the introduction of hazards, contaminants and the cross-contamination of finished product.<sup>1</sup>

The impacts for manufacturers from product contamination caused by inadequate plant maintenance can be disastrous. Some examples include:

- Cross-contamination of pasteurised milk with raw milk or chilled water due to cracked heat exchanger plates.
- End product contaminated with foreign material due to disintegration of plant equipment such as pump impellers and filters.
- Microbial contamination of processed product through leaking seals and gaskets.

The costs incurred in both monetary and labour terms can also be significant and may result in the potential loss of consumer confidence and supplying contracts, as well as possible litigation. Actions that may need to be implemented in such situations may include:

- A product recall.
- Product disposal or reprocessing.
- Production re-runs to fill orders.
- Investigation of cause and prevention of recurrence.
- Replacement of damaged equipment.

The implementation of a Preventative Maintenance Program provides an effective safeguard in keeping equipment and premises in proper working condition to ensure that the risk of product contamination is minimised.

The main elements of a Preventative Maintenance Program include:

- An equipment register and flow diagrams.
- An inspection/review plan and schedule (includes development & implementation).
- A spare-parts stock register.
- A lubrication schedule.
- Record keeping of all maintenance and maintenance reviews/inspections, including any unscheduled maintenance.
- Food safety training and competency of staff.



### Equipment/machinery register and flow diagrams

The initial step in a Preventative Maintenance Program involves preparing a list of all manufacturing machinery and equipment in the plant that will need to be maintained.

The collation of this list will assist in the development of a maintenance inspection/review plan and schedule that covers:

- what equipment/machinery is to be inspected;
- what performance indicators of the equipment/machinery are to be monitored;
- what actions are taken when performance parameters are not within specification limits;
- where the equipment/machinery is located, when it is to be inspected and by whom; and
- how the inspection/review is to be conducted.

The maintenance inspection/review plan should also include a monitoring system to capture all of this information. And flow diagrams of all processes also need to be prepared, indicating the points where

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performance monitoring and maintenance checks will be conducted.

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### Inspection plan and schedule

When developing the plan and schedule, there are various resources that should be considered to ensure that all of the relevant elements are covered and that the implementation will be practical. These resources include:

- *Equipment Specifications & Manuals* - These provide the theoretical basis for determining what needs servicing and maintenance, and how frequently this should be done.
- *Equipment History* - All equipment is prone to wear and tear over time. The details of the age of the equipment and its repair and service history are important in making objective assessments to assist in determining the frequency of inspections and maintenance.
- *Staff Knowledge and Experience* - The collective experience of engineering staff, production operators and maintenance staff are an invaluable resource for determining any inherent characteristics that can be attributed to particular equipment. For example, in many factory operations there will be unavoidable deviations in operating conditions that are considered 'normal' by the equipment manufacturer.

Also included in a well designed Preventative Maintenance Program should be a schedule for the inspection and maintenance of non-standard items which are regarded as not being manufacturing machinery/equipment. These non-standard items include structural items such as; floors, walls, ceilings, buildings and civil structures. The scheduled up keep of these items will assist in the prevention of product contamination.

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### Spare-parts stock register

It is important to stock critical equipment components and spare-parts. At a minimum, consumables such as gaskets, bearings, seals and lubricants should be on hand, as well as sufficient equipment spares and engineering accessories to cover basic service needs and repairs.

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### Lubrication schedule

Lubrication comprises a significant part of a Preventative Maintenance Program. The choice of appropriate (i.e. fit for purpose) lubricants is critical in any food processing operation and specialised advice on selection, application, and training on their use is recommended. It is also important to apply lubricants regularly (i.e. have a lubrication schedule) and to apply them in accordance with

their label directions so as to prevent possible contamination of product and to ensure that unnecessary friction and wear on the equipment/machinery is reduced.

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### Record keeping

It is important that an appropriate reporting and recording system is adopted as part of the Preventative Maintenance Program so that prompt actions can be taken when any deviations occur.

Card file systems have traditionally been used for recording details, however more recently these cards have been linked to computer storage systems. The cards identify each particular machine or piece of equipment, detailing all items needing inspection, with a section for confirming the actions performed, and a section to record non-routine work or observations.

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### Staff training and competency

The size of each manufacturing site's operations will determine to a large extent the number and range of maintenance staff employed. Some smaller operations may not warrant employing staff to perform maintenance functions, and may rely solely on independent contractors to perform these tasks. Regardless, it is imperative that all maintenance people entering food production areas are suitably trained, and understand the implications of working in a dairy food manufacturing environment. Contamination of product contact surfaces needs to be avoided, and production staff need to be informed of maintenance work so that plant cleaning can be arranged following such work.

Many dairy manufacturing businesses are a seven-day-a-week operation. Liaison between maintenance and production staff as to the timing and carrying out of maintenance is therefore essential to derive the maximum benefits from a Preventative Maintenance Program.

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### References

1. Dairy Food Safety Victoria (2002), 'Code of Practice for Dairy Food Safety'. Available at: [www.dairysafe.vic.gov.au/pdf/DFSV\\_CodeOfPractice2002.pdf](http://www.dairysafe.vic.gov.au/pdf/DFSV_CodeOfPractice2002.pdf)
2. Hall, H.S. and Tuszyński, W.B., Food and Agriculture Organisation of the United Nations (1984), 'Maintenance Systems for the Dairy Plant - FAO Animal Production and Health Paper 45.' Available at: [www.fao.org/DOCREP/003/X6548E/X6548E00.htm](http://www.fao.org/DOCREP/003/X6548E/X6548E00.htm)

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### Further information

Other Dairy Food Safety Notes are available at  
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