Technews
National Dairy Development Board
For Efficient Dairy Plant Operation

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Plant Maintenance

This bulletin includes technical information, latest developments on products, systems, techniques etc. reported in journals, companies' leaflets, books and based on experience. The technical information would be on different areas of plant operation in different issues. It is hoped that the information contained herein, if employed in the factory, will help in making dairy plant operations more efficient.

Your contributions and suggestions will make the bulletin more useful, and are welcomed.

The theme of information in this issue is **Plant Maintenance** in dairy plants. It may be understood that the information given here is by no means complete.

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1. Instruments for Early Detection of Machinery Fault

Sudden machinery breakdowns have a direct effect on dairy factory's profits.

An effective condition monitoring programme, as a part of predictive maintenance system, can predict failures of bearings and other machine components before they occur. The major advantage of early detection of faults of machine components is that corrective action can be taken to prevent further damage and hence extend components' life through improving lubrication, correcting components' alignment, imbalance and bent shaft or other action as recommended by the appropriate maintenance manuals.

Electronic instruments are available for reliable on-line detection of components' damage or lubrication starvation or shaft misalignment. These instruments are based on multi- parameters monitoring. They are easy to use, accurate and fast.

2. Lubrication - Errors & Management

There are nine common errors usually encountered in lubrication management. Large money can be saved and more satisfactory operation of plant can be achieved through paying attention to these points. They are:

(a) Loose responsibility for lubrication.

(b) Use of too many kinds of lubricants. Suppliers recommend wide types of lubricants. However, today's multi-purpose lubricants can be used in place of several individual products, thereby saving money.

(c) Storage & handling : Storage facility for several weeks supply should be considered. Lubricants should be purchased in bulk which will save money and will also provide against shortfalls.

(d) Inadequate scheduling : Lubrication scheduling is usually done based on manufacturer's recommendations. However, machine running conditions are also important. Running time, rather than calendar days, is the realistic standard for determining the time of lubrication.

(e) Lack of mechanical inspection : The lubrication-man should use his eyes, ears and nose to recognize conditions which will lead to breakdown. He should carefully look for wear, score marks, fractures and chipped teeth.

(f) Automatic system would do a job better. This eliminates labour and waste of lubricants, and reduces down time.

(g) Waste of good oil : Many lubrication-manhabitually throw out lubricants before the end of their useful life. Drain recommendation may be more frequent than required under the service. Laboratory analysis at the end of the drain time may indicate that a change is not required.

(h) Inadequate filtration and purification : Filtering and purification can extend the useful life of lubricants. Portable filtering equipment will clean and decontaminate lubricants while machine is running.

(i) Failure to know the true costs of lubrication: A good record system lists each lubrication or other maintenance job on each machine. This would help in reducing lubrication costs.

(Source : Food Engineering Systems, Vol2 : Farrall, A-W., AVI)

3. Distinguish Genuine Bearings

Wrong selection of bearings (spurious and reconditioned bearings) results in unnecessary production delays, frequent breakdowns, wastage of money and so on. The following 10 points will be useful to distingish spurious/reconditioned bearings from the genuine ones:

(a) Compare carefully the packaging, markings on the package and on bearings with the one supplied by the original manufacturers. Check the letters sizes, logo style and its size.

(b) Compare the rust preventive coating on the bearings with the bearings supplied by the original manufacturers. Check carefully uniformity of coating applied.

(c) Any axial mark on the bore diameter or the outside diameter of the bearings would indicate that the bearing has been previously mounted on the shaft or in the housing of an equipment.

(d) Any bearing which has been used would acquire a slightly dull finish on the raceways.

(e) Any bearings having rust spots/ nick marks on the critical surfaces like raceways or rolling elements should not be accepted.

(f) In some cases of spurious bearings, the re-stamping is done after heating the rings. The resulting blue-black dis-colouration can be observed near the stamping/etching.

(g) Carefully look for polishing marks which would be normally uneven caused by fine emery paper to remove rust spots. If the trade marks have been changed on the bearing

side face, then these polishing marks would be prominent near the surface where the trade mark is generally stamped/etched.

(h) Compare carefully grain flow of the bearing surfaces with the original bearings.
(i) Normally in the cylindrical roller bearings and spherical roller bearings, it is possible to measure the radial internal clearance of the bearings. Compare it with the catalogue values given for new bearings.

(j) The change of trade mark on the bearings would involve removing all material from the bearings side surfaces at those positions. This would change the tolerances on the width of these bearings and this measurement would help in distinguishing spurious bearings with the original.

(Source: Purchase, February 1992).

4. Have Lubrication Problems ? Then Read This.

Air Compressor

(a) Most likely encountered problems are oxidation and dirt.

(b) The contact of oil and air promotes oil oxidation. This leads to the formation of oil insoluable lacquer, which can deposit on rotors and valve plates causing mal-function. Under extreme cases the oil can carbonize.

(c) The oil used, therefore, should be excellent resistant to oxidation, should minimise carbon deposits on the valve plates thereby reducing risk of fire and explosions, should provide effective protection against rust and corrosion during routine shut down, should resist water washing action and maintain strong oil film on metal surfaces.

(d) Poor maintenance of air filters on the incoming air side can lead to dust and dirt in the oil, which is very dangerous for rings, valves and other close tolerance parts. Hence, proper and efficient maintenance of air filter is important.

Refrigeration Compressor

(a) The problem most likely encountered is oxidation of lubricants.

(b) Air can get into the Ammonia system and cause the above problems. The oxidation products react with the refrigeration to form very heavy oil insoluable sludge.

(c) Hence care should be taken to stop air leaking into the system.

Gear System

(a) The common problem is oil oxidation due to high working tempratures and high load conditions.

(b) This results in increase in oil viscosity. Deposits formation takes place. Sludge insoluables increase. Outside contamination will depend upon gear case design and environment.

Following warning limits for used oil should be kept in mind:

Sr. No.	Oil Property	Type of Oils Gear	Air Compressor & Refrigerating Compressor
1.	Vicosity change, % maximum	25	25
2.	Pentane insolubles, % maximum	0.5	0.1
3.	Water content, % maximum	0.2	–

(Source : Industrial Oils, Petroleum Conservation Research Association)

5. Care in Replacing Rubber Gaskets in Pasteurisers

Following care should be taken in replacing rubber gaskets using adhesives (not snap-in gaskets) in pasteurisers and plate heat exchanger :

1. Remove all loose remnants of old gaskets and adhesive carefully from the gasket groove with the help of special chemical gasket remover.
2. Clean the gasket groove and the back of the gasket by the gasket remover thoroughly. Sandpaper the back of the gasket.
3. Apply a thin coat of quality gasket cement to the gasket groove and the back of the gasket.
4. The adhesive should be stirred before use. A small brush should be used for even distribution of the adhesive. When the adhesive is dry but sticky in about 3-5 minutes, fit the gasket in the groove and press down firmly all round. It is essential that the gasket is placed flush with groove, otherwise it may get displaced when the pasteuriser is tightened.

   The adhesive in the gasket groove and on the gasket must be free from finger prints, oil or the like. It is good to put the plate under pressure for a few minutes as soon as the gasket is fixed. The gasket should be powdered with talcum powder in order to prevent it from sticking to the opposite plate.

   When the plate is put in place again, the pasteuriser should not be tightened more than sufficient to prevent leakage. If the gasket or plate does not remain in its correct position, check whether the adjacent plates and their gasket are in correct position.
5. **The compression in the whole heat exchanger should be reduced when the pasteuriser is warmer during cleaning and sterilisation than in normal operation to increase the life of the gasket. This should also be done when the pasteuriser is out of use.**

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☐ Useful ☐ Informative ☐ Boring

☐ Only entertaining

I think the format of this bulletin needs/does not need changes.

I would like information in any subsequent issue on_____

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